ENGINEERING NEWS

A JOURNAL OF

CIVIL, MECHANICAL, MINING AND
ELECTRICAL ENGINEERING

VOLUME LIV

JULY—DECEMBER, 1905

THE ENGINEERING NEWS PUBLISHING COMPANY

NEW YORK

INDEX

TO VOLUME LIV, JULY–DECEMBER, 1905

Subdivided into ILLUSTRATIONS: GENERAL (including *Technical Articles, Editorials, Letters to the Editor* and *Current News*); AUTHORS: ENGINEERING LITERATURE and CONTRACT PRICES.

INDEX TO ILLUSTRATIONS.

A.

Abbot, H. L. 260
Air lift for printing press service 612
Annealing furnace for eye-bars 176
Arches:
Cannington viaduct 452, 454
Parabolic concrete, Wash., D. C. 510
Reinforced concrete bridge, La Salle, Ill. 293, 295
Steel, Zambesi River bridge.....339, 344
Three-hinged steel, Exeter, England.... 58

B.

Beams:
Reinforced concrete 302, 304
Reinforced concrete beams with vertical stirrups 6, 7
Belts, Diagram for computing power capacity 149
Berg press for sand-lime brick 213
Blast on Penn. R. R.....677, 680
Blasting, Submarine 1, 105, 106
Blower operated by steam turbine 493
Blue print apparatus 169
Boat, Drill 2, 3
Brake, Track, on street railway 327
Breakwater construction at Port Colborne 158
Brick:
Bricks from Bismya 254, 255
Manufacture of sand-lime brick...211, 213
Special brick for tunnel lining 194, 195
Bridge accidents:
Johnstown, Pa 524
Milwaukee, Wis. 127
Bridge floors, Proposed concrete 460
Bridges:
Austerlitz 604, 609
Barcelona, P. I. 509
Chain suspension, Budapest 187, 193
Chicago track elevation 245, 246
Deer Park Gorge, La Salle, Ill. 293, 295
Exeter, England 58, 59
German Black Forest 155, 157
Johnstown, Pa., Wreck 524
Manhattan 107, 118, 588, 589
Maumee, Ohio.. 39
Plauen, Saxony 156
Quebec cantilever 272, 274
Temporary bridge with pontoon draw span 698
Timber foot-bridge 265
Wash., D. C.:
Concrete arch 510
Steel arch 656, 661
Zambesi River 339, 344
Bucket elevator for mine shaft 598, 600
Buildings:
Myers store, Albany 248, 249
Recreation building 163, 165
Reinforced concrete factory 666
Union engineering 615, 616
Burr, W. H. 260

C.

Cable saddles at anchorages 115
Canal, Panama 618, 632
Canal location 150
Cars:
Gasolene motor 653
Hart convertible ballast and freight.. 14
Portable sub-station car 447
Steam motor 57, 350, 351
Steel electric for N. Y. C. R. R. 504
Steel motor car, L. I. R. R. 449
Catt, George W. 384
Cement plant at Roosevelt dam 208
Chain cable suspension bridge 188, 189
Charging and discharging machines for gas retorts 233
Chimneys:
Reinforced concrete 120
Self-supporting steel 64
Cistern, Reinforced concrete 331
Coal conveyor 239
Coal handling plant, Syracuse Lighting Co. 397, 398
Cofferdams, Crib 561, 564
Concrete:
Effect of heat upon 36
Safeguards against freezing of 240, 241
Concrete arch decorated with colored clays 687
Concrete block manufacturing plant .. 428
Concrete block shelter houses 39
Concrete block tower as weir 523
Concrete blocks and their use in building construction.....43, 159, 363, 371
Concrete floor in Jerome Park reservoir. 290
Concrete in steel cylinders tested 459
Concrete molds:
Block construction 159
Fence posts 67
Piers 453
Stamped metal forms 484, 485
Concrete mixing plants 240, 613
Concrete reservoir work.....681, 684
Concrete revetment for cliff 465
Concrete scow 159
Concrete spreader 243
Concrete walls, Staging and forms for.. 165
Condenser for shaft-sinking pumps 360
Conveyor, Traveling 270
Copper sulphate treatment of water 575
Crane, Locomotive shovel 398
Crib, Timber 158, 159
Crossing frog with continuous rails 145
Culebra cut 682

D.

Dams:
Apple River Power Co. 375, 376
Concrete, at Niagara Falls 477
Diverting dam, Brigham City, Utah 238
Gatun, Panama Canal 83
Lake Avalon 10
Movable dam, Mermentau River, La... 320, 323
Pathfinder, Wyoming 142, 143
Steel, Typical bent for 324
Temporary crib dam 545
Davis, G. W. 259
Derailing devise for side tracks 513
Derrick car 244
Derricks:
Dumping cars and wagons 196, 197
Traveling, for constructing tunnel lining 269
Diagrams:
Attendance at University of Michigan 117
Cement tests 664, 665
Cement and concrete tests 300
Computing power capacity of belts 149
Diameter of branch pipes in ventilating system 557
Heat exposure of concrete 36, 37
Lamp filaments, effect of firing treated, at different temperatures 45
Load diagrams of Brooklyn Rapid Transit Co. 34, 35
Magnetic circuit of inductive rail-bond, effect of air-gap 33
Moment capacity of I-beams of reinforced concrete 518
Mortars, Tensile strength of 140
Progression of wave-trains of current, and pressure from periodic arc at a short circuit 8
Rainfall and temperature at Manila, P. I. 542
Steam consumption on warships ..569, 570
Stress-strain curves of steel 209
Surveys of Simplon tunnel 663
Ties, Removals of treated, on A., T. & S. Fe Ry. 5
Wage rates 333
Yardage of a trench, Estimating 18
Diverting boom construction 478
Domes:
Naval Academy chapel 25, 31
Reinforced concrete 96
Drawing 88, 80, 152, 153, 257
Drawing board for field use 129
Dredge-bucket, Williams clam-shell 170
Drill, "Little Jap" pneumatic 146
Drill boats 2, 3, 160
Drill-core removed from steel I-beam... 579
Dry dock, Floating, Cavite, P. I. 585, 586
Dump wagon, Briggs 243
Dumping muck cars into cars beneath .. 137
Dust collector for asphalt plant 335

E.

Electric power plants:
Apple River Power Co. 375, 377
Brigham City, Utah 235, 238
De Sable, Cal. 131, 136
Electrical Development Co. of Toronto 475, 480
Long Island R. R. 445, 449
Missouri River Powerhouse 401, 404
N. Y. C. R. R. 505, 508
Niagara Falls 561, 568
Electrical devices for borehole surveying 92, 93
Elevator, Bucket, for mine shaft...598, 600
Elevator, Plunger 635, 637
Excavators:
Cross-cut for ditch and canal work.... 250
Submarine rock 201
Eye-bar manufacture 176

F.

Falseworks at Budapest suspension bridge 193
Fastening for shear and tension bars.... 327
Fence post, Reinforced concrete 66, 67
Fire shutters 625
Flume, Timber 132
Foundation, Spread, of reinforced concrete 77
Freight yard at Alexandria, La. 583
Frog, Crossing, with continuous rails .. 145

G.

Gage for lining and checking curves in railway track 514
Gaging streams 634
Gas engines 216, 224
Gas-holder; Modern 421, 427
Gasket for high-pressure pipes 354
Girders:
Circular, Naval Academy, chapel 27, 30
Reinforced with unit reinforcing frame of quadruple bars 230, 231
Governor, Lombard, and Doble nozzle.. 133
Grapple, Farrington 70
Guerard, Adolphe 261

H.

Hanger attachment for concrete beams . 228
Hanger for concrete floor forms 145
Headlight, Edwards electric..... 141
Hoisting apparatus for shutters of Mermentau River movable dam 323
Hunter, W. H. 261
Hydraulic engine, Rife 128

I.

Incandescent lamp light signal 34
Indexing methods 60, 62
Inset, New York Central terminal plan.1499
International Waterways Commission ... 328

K.

Kraus, J. 332

L.

Leveling instrument, Prismatic..... 696
Lighthouse, Gibb's Hill, Bermuda 225, 226
Loading coal into box cars 119
Loading hopper 243
Lock and dam, Mermentau River, La.320, 321
Locomotive hollow firebrick arch 200
Locomotives:
Compound, with superheaters 537
Duplex compound 672
Single-phase electric 16
Long, T. J. 580

M.

Magnetic switch panel board 481
Manhole for reservoir..... 684
Mapping location of buildings on city streets 173
Maps:
California Gas & Electric Corporation . 132
Florida, Southern 278
Florida East Coast Ry..... 407
Long Island R. R. 446
N. Y. C. R. R., Electric zone 500
Panama Canal 81, 83, 573
Toledo Urban and Interurban Electric Ry. 38
Victoria Falls 340
Washington, D. C. 267

N.

Naval Academy chapel 25, 31
Noble, A. 262

O.

Oil switch gallery, De Sable power station 136
Ore-unloading machines and conveyor bridges 125, 126
Organization chart 100

P.

Palm leaf stalk 74
Parsons, W. B. 262
Patterson, T. L. 621
Pepperman, W. L. 63
Pier shed erection 286
Pile foundation for a movable dam..... 101
Piles:
Corrugated reinforced concrete ..594, 595
Steel sheet 545, 546
Pipe flanges 596, 597
Pipe joints:
Cast iron hub 237
Leaded, for lap-welded steel pipe 145
Malleable iron fitting 238
Pitkin, A. J. 552
Pitot tube used in gas main 661, 662
Post, Reinforced concrete 66, 67
Propellers, Screw 471
Pumping engine, Sewage 11, 13
Pumping sand 587
Push cart for concrete 359

Q.

Quellennec, E. M. 262

R.

Racks over penstock mouths 478
Rail-bond on alternating-current signal system 33
Rail fastenings 202
Rail fastenings for concrete ties 349
Rail sections, British and American 85
Railing of reinforced concrete bridge.. 295
Rails:
English bull-headed 435, 436
Third rail on N. Y. C. R. R. 501
Railway construction on Penn. R. R.677, 680
Railway stations:
Cincinnati freight station 503, 504
Grand Central 499
Suburban, N. Y. C. R. R. 502, 503
Railway terminals:
Alexandria, Va. 583
N. Y. C. R. R. 1499, 508
Randolph, Isham 263
Reinforced concrete, Mushroom system .. 383
Reinforced concrete tests 302, 305
Reinforced concrete water supply conduit 639
Reservoirs:
Fort Meade, S. D.....681, 684
Storage, Oberlin, Ohio..... 313
Retaining wall design 519
Ripley, Joseph 263
Rivets, Tightening loose 357
Roadway for contractors' wagons 197
Rock excavator, Submarine 201
Roof shield for tunnel work 325, 326
Roofs:
Saw-tooth 551
Solid wooden slab 149
Ross, D. W. 63

S.

Saw, High-duty cold, with teeth of high-speed steel 412
Scow, Concrete 159
Screw propellers 471
Sea-mill of Cephalonia 352
Sewer cleaner 337
Shell, Capped armor-piercing 346, 348
Shelter houses, Concrete block 39
Signal systems on electric railways 32
Sluice box 78
Smoke vent with fire shutters 625, 627
Snow compressing machine 95
Snow plow for electric railways 338
Stadia rod 486
Stadia slide rule 487
Stamped metal forms for concrete ..484, 485
Steam regenerator, Rateau 151
Steam shovel operated by wire rope.... 686
Steam turbine blades:
Allis-Chalmers 638
Parsons 571
Steam turbine-operated blower 493
Steam turbines:
Hamilton 495
Warren 494
Steamer "Fathomer" 317, 318
Stearns, F. P. 263
Stevens, John F. 19
Sub-station, Portable 447
Superheater on compound locomotive .. 538
Surveying, Location of buildings on city streets 124
Swimming tank 164

T.

Testing machines:
Cummings 138, 139
Steel tests 209
Theater fire protection 624, 627
Ties:
Carnegie steel 202
Concrete 175, 349
Methods of piling 5, 87
Steel 349
Tilting cradle for loading coal into box cars 119
Tincauzer, Eugen 264
Tower for carrying electric power wires 377, 378
Tower, Steel, for water tank 430, 432
Towers for Manhattan bridge 108, 115
Track:
Concrete substructure 460
Steel longitudinals 576
Track brake for street railway 327
Track elevation, Chicago 244, 246
Trestle, Temporary, to carry viaduct .. 442
Tunnel shield 325, 326
Tunnel timber lining 480
Tunnels:
Barrientos, Mexico 137
Cincinnati water-works 194, 195
Hudson River, N. Y. & N. J. R. R. Co. 441
Penn. R. R., Wash., D. C. 268
Water pipe tunnel at Boston 44
Turnouts and crossings, Table of 42

U.

Upsetting machine for eyebars 177

V.

Viaducts:
Cannington 452, 454
Reinforced concrete 408
Vicat needle apparatus 174

W.

Water-hoist, Automatic 582
Water pipe:
Fort Meade, S. D..... 681
Old wood stave pipe 466
Riveted 78
Wood stave 237, 238
Water pipe tunnel, Boston 44
Water pressure regulators..... 689
Water tanks:
Concrete bottom 432
Elevated, on steel tower 430, 432
Railway 457, 458
Water wheel, Doble 134
Weirs of concrete 372, 523
Welcker, J. W. 264
Winds at Manila, P. I. 540
Wood, Ancient 555

*refers to insets.

143666

GENERAL INDEX.

A.

Abbot, H. L., Biographical sketch of...*200
Accidents:
  Boilers:
    Gunboat "Bennington" 103, 210
    Washington, D. C., power house.... 525
  Bridges:
    Johnstown, Pa. *524
    Milwaukee, Wis. *127, 147
Building collapse at Albany.....
    154, *248, 251, 334
Dam Mermentau blown up..... 385
Dredge "Sir Wilfrid" sunk 170
Elevated railway, New York.....281, 361
Elevators:
  Buffalo 177
  Philadelphia 80, 170
Fire at Hoboken terminal 154
Landslide at Thompson River, B. C... 177
Railway:
  Boston & Maine 583
  N. Y., Chic. & St. Louis 177
Steamer in the English Channel..... 559
Water main break in Chicago 473
Agricultural engineering, Teaching, in Land Grant Colleges. By C. J. Zintheo 658, 669
Air:
  Flow of, in metal pipes. By J. H. Kinealy 134
  Flow of, through circular orifices under low heads 624
Air-brakes on freight train service. Experience of leading railway companies 495, 553
Air lift for printing press service of the Oregonian Pub. Co. By A. W. Cochran *612
Air lift pumps for deep wells 312
Air Machinery, Mechanics of. By J. Weisbach and G. Hermann.....
    Eng. Lit. 52
Alinement, Improving. By W. Urquhart, C. E. Bengler, R. W. Gay, W. N. Frickstad 438, 517, 633
Alternating Currents and Alternating Current Testing. By C. F. Smith....
    Eng. Lit. 285
Aluminum, Use of, in steel ingots to reduce segregation 443
American Institute of Electrical Engineers, Convention 2
American Railway Mechanical and Electrical Association, Convention ..356, 359
American Society of Heating and Ventilating Engineers, Convention 40
American Society of Mechanical Engineers, Convention 622
American Society of Municipal Improvements, Convention 270, 275
American Society of Refrigerating Engineers, Convention 619
American Society for Testing Materials:
  Convention 21, 27
  Relations with the International Association 333
American Street Railway Association, Convention 356, 358
Anchor-bolts in steel chimneys. By J. D. Adams 64
Annealing furnace, Gas, for eye-bars, Keystone Bridge Works, 1882. By J. H. Springer, Sr.....*175
Arches:
  Calculation of Austerlitz bridge arches. By Rene Bonnin *604
  Concrete parabolic arch bridge, Wash., D. C. *510
  Concrete viaduct arches, Cannington. By Arthur Wood-Hill and E. D. Paln *452
  Formulas for crown thickness of masonry and concrete arches. By Emile Low, F. F. Weld 554, 602
Hinged steel arch, Exeter, England... *58
Masonry arch at Plauen, Saxony. By W. J. Douglas *155
Reinforced concrete, La Salle, Ill. By J. B. Strauss *203
Steel:
  Exeter, England, Hinged arch..... *58
  Washington, D. C., over Potomac River *356
  Zambesi River, Victoria Falls.....*339
Architects and concrete block construction 553, 603
Architectural building work, The field for engineers and engineering contractors in 310
Architecture and engineering, Fact and idea in. By R. S. Buck..... 674
Arctic expedition by Peary 80
Armor plate, Measuring blow of projectile striking 606
Arsenic, Influence of, in pickling solutions. By C. F. Burgess 352
Asphalt. Richardson's book discussed by F. Condit and S. Whinery.....
    Eng. Lit. 50
Asphalt paving plant, Municipal, at Montreal. By J. R. Barlow.....*335
Assessments for local improvements in New York City..... 335
Association of Railway Superintendents of Bridges and Buildings, Convention 432

B.

Bacteriology and Public Health. By George Newman.....Eng. Lit. 53
Ballast and freight car, Hart convertible. *13
Beams. (See Reinforced concrete.)
Bearings:
  Discussion at American Society of Mechanical Engineers 622
  Literature on knife-edge bearings wanted 437
Belts, Diagram for computing power-capacity of. By R. W. Dull..... 149
Bevels, Computing, with the slide rule. By C. N. Haggart 124
Bid, Unique, for sewer construction..... 361
Bins and the storage of granular and lump material. By W. E. Hunter and J. S. Myers *89
Blast, Stigerwalts', on Penn. R. R..*677, *680
Blasting, Submarine:
  Dynamite blast at Portsmouth Navy yard *105, 121
  Rock excavation at Buffalo Harbor..... *1
Blower, Steam turbine-operated centrifugal 491, *493
Blue print apparatus with ordinary window. By H. O. Garman *169
Boiler compounds, Use of. By W. M. Booth 102
Boiler explosions:
  "Bennington." Report by Naval Board of Inquiry 103, 210
  Washington, D. C., power house..... 525
Bolts, Anchor, for self-supporting steel chimneys. Tables. By J. D. Adams 65
Book-making, Author's part in the technic of.....Eng. Lit. 49
Borehole surveying, Deep, Electrical devices for. By H. F. Marriott...*91, 97
Brakes:
  Air-brakes in freight train service.495, 553
  Emergency track brake for street railway cars, San Francisco. By F. F. Bodler *327, *360
Breakwater construction and rock excavation at Port Colborne harbor, Ontario. By J. M. Hogan *158
Brick:
  Evolution of the Babylonian brick. By E. J. Banks *254
  Manufacture of sand-lime brick.....*211
  Special brick for lining tunnel of Cincinnati water-works *194
Bridge accidents:
  Collisions between vessels and drawbridges 147
  Johnstown, Pa., Bridge wrecked by derailed car *524
  Milwaukee, Wis., Drawbridge wrecked by steamer *127, 147
Bridge design:
  Bridge and Structural Design. By W. C. Thomson.....Eng. Lit. 646
  Design and Construction of Metallic Bridges. By W. H. Burr. Eng. Lit. 531
Bridge erection:
  Cost, Dearth of literature on.....203, 388
  Methods and costs. Report of Railway Superintendents 440
  Railway bridges. By Lee Jutton.....564
Bridge floors:
  Concrete, Proposed, for bridges and tracks. Rails on longitudinal timbers. By J. W. Schaub, J. F. Jackson, J. L. Campbell.....*480, 554, 555
Corrosion from refrigerator-car brine...440
Bridge Stresses, Statically-Indeterminate, in Frames Commonly used for Bridges. By Isami Hiroi..Eng Lit. 530
Bridges:
  Austerlitz, Calculation of Arches in. By Rene Bonnin *604
  Budapest chain suspension *187
  Cannington viaduct, England. Concrete construction. By Arthur Wood-Hill and E. D. Pain, Emile Low, F. F. Weld.....*452, 554, 602
  Cantilever bridge at Quebec *272
  Chain suspension, at Budapest.....*187
  Chic. & N. W. Ry. subway and overhead bridges. Stresses in viaduct columns *244, 335
  China. Hankau-Peking Ry. bridge of 102 spans 587
  Cleveland, Ohio, Strauss bascule..... 675
  Deer Park Gorge, La Salle, Ill. Reinforced concrete ribbed arch. By J. P. Strauss *293
  Exeter, England. Three-hinged steel arch *58
  Fraser River bridge testimonial 206
  Kentucky River viaduct of 1877, Credit for design of 17
  Manhattan:
    Contract. Supreme Court desision... 559, 577, 580
    Moving platforms 693
    Steel superstructure *111, 121
    Terminal designs *588
  Norfolk & Western Ry. viaduct foundations reconstructed with concrete piles *441
  Philippine Islands, American steel highway bridges in *509
  Plate-girder deck bridges of the Duluth & Iron Range Ry..... 497
  Plauen, Saxony, in the Black Forest....*155
  Potomac highway bridge 103
  Quebec cantilever across the St. Lawrence *272
  Reinforced concrete viaduct on the Florida East Coast Ry.....*407
  Spacing of stringers 440
  Suspension, Chain, at Budapest.....*187
  Temporary bridge with pontoon draw span over Chicago River.....*698
  Timber foot-bridge in Boston park. By W. T. Pierce *205
  Toledo, Urban & Interurban Ry. at Maumee, Ohio. By J. S. Worley.. *38
  Washington, D. C.:
    Parabolic concrete arch *510
    Steel Arch street bridge *656
  Williamsburg. Legal decision in Roebling suit 356
Zambesi River, Erection of steel arch.*339
Bucket elevator for raising ore from mine shaft *598
Building Code of New York City, Proposed revision 641
Buildings:
  Chicago ordinance regulations as to hollow concrete block construction. 692
  Collapse of Myers store, Albany. The owner's responsibility in reconstruction work *248, 251, 334
  Concrete building construction in railway work 433
  Lighting of mill buildings. By C. A. Raymond 94
  Naval Academy Chapel, Annapolis.... *25
New York City. Tower Building demolished 41
Philadelphia. Rules covering the manufacture and use of hollow concrete blocks 406, 413
Rapid erection of pier shed frame, D. L. & W. R. R. *296
Recreation buildings for Chicago South Park system *162
Reinforced concrete:
  Factory building, Charlotte, N. C.....*666
  Naval Academy Chapel *25
  Warehouse design *382
Steel and wire glass church, Des Moines, Ia. 108
Union Engineering, Report on *615
Buildings: (Continued.)
  Warehouse design of reinforced concrete. By F. W. Keyser, E. L. Heidenreich, C. A. P. Turner.....*382
Bureau of Yards and Docks, Work of... 691
Burr, W. H., Biographical sketch of....*200

C.

Cables of chain suspension bridge at Budapest *187
Caisson disease, Suit for damages..... 208
Calcium carbide and acetylene. By J. B. Morehead 200
Canals:
  Chicago drainage, Cost of..... 441
  Dalles-Celilo, of the Columbia River..46, 75
  Inferiority of canals as a means of freight transport. By Daniel Bellet 419
  Locating irrigation canal tangents so cut and fill will balance. By C. L. Swain, V. L. Havens, J. W. Hays, M. H. Wright 18, *149, 310
New York barge canal, Progress..... 157
Panama:
  Administration of Canal Affairs at Washington. Appointment of Pepperman and Ross *63
  Appropriation, Emergency 583
  Conflict of Engineers over plans:
    Discussion by Wm. Ham. Hall..... 572, 577, 589, 616
    Majority and minority reports probable 553, 559
  Culebra Cut. Graphic comparison...*632
Dynamite carrying steamers in canals. By J. M. Wemlinger..... 696
Engineers, Board of consulting.....
    *259, 275, 316, 443
  Examinations for positions 337
  Expenditures, to June 30, 1905..... 472
  Labor situation 23, 361
  Progress of work:
    Randolph, Isham, on conditions at Panama 442
    Shonts, T. P., on what has been accomplished 512, 515
    Taft, W. H., on progress made.548, 604
    Young engineer's optimistic view of conditions 174
  Sea level plan, Objections to. Pres. Roosevelt's remarks to Advisory Board. By C. E. Gillette..*81, 97, 333
  Wallace, J. F., Resignation of.....17, 20
Sault Ste. Marie, Traffic increasing.... 72
Car couplers, Variation in height of.... 601
Cars:
  Dump, Hart convertible *13
  Electric, for N. Y. C. terminal traffic.*504
  Gasoline-electric on B. & O. Ry..... 584
  Gasoline motor car, Union Pacific Ry.. 633, 669
  Hart Convertible ballast and freight car *13
  Hopper-bottom coal cars with middle and end hoppers, Scotland 47
  Steam motor cars:
    Glasgow & Southwestern Ry..... *57
    London & Northwestern Ry., England 675
    Midland Ry., England 675
    South Australia 584
    Taff Vale Ry., England *350
  Steel cars:
    Flat cars for transporting heavy castings, P. & L. E. Ry..... 125
    Motor car on Long Island R. R.....*449
    Passenger cars for the future..... 438
Cart for transporting concrete, Ransome.*359
Cast iron. (See Iron and steel).
Catt, George William, Sketch of.....*384
Cement:
  Activity, Relative, of natural and Portland cements. By L. J. Johnson, Edwin Puzey 517, 602
  Coked cement compared with fresh cement. By J. W. Hays 671
  Imports of hydraulic cement into U. S. 1900-1905, 420
  Low-pulling, early-stage Portland cement vs. the ordinary early strength developing product. By W. A. Aiken, Bernard Enright, F. H. Lewis, W. O. Hartranft.....
    63, 124, 149, 206
  Manufacture:
    First attempt in the U. S. by D. M. Randolph of Virginia. By E. C. Eckel 613
    Manufacture of Cements, Limes and Plasters. By E. C. Eckel. Eng. Lit. 394
  Specific gravity and weight of cements. By E. C. Eckel 238
  Specifications, Comparison of British and American. By R. W. Lesley. 523
  Testing cement with Vicat needle apparatus *174
  Tests of cement and concrete at St. Louis Exposition. By R. L. Humphrey *300, 309, 379
  Tests on a Portland cement plant, Iola, Kansas. By E. C. Soper.....*664, 670
  White Portland cement, Experiments on the manufacture of. By C. D. Quick 687
(See also Concrete.)
Cement joints for gas mains..... 621
Cement kilns:
  Chicago Portland Cement Co. 675
  Lengthening rotary, as a means of increasing their fuel efficiency. By E. C. Soper *664, 670
Cement mortars, Effect of clay and loam on the strength of. By W. C. Hoad 140
Cement works at Roosevelt dam, Arizona.*208
Center of land section. (See Surveying.)
Central States Water-Works Association. 311
Cephalonia, The "sea-mills" of. By W. P. Mason *352
Charging and discharging machines for gas retorts *233
Chemistry, Engineering. By T. B. Stillman .....Eng. Lit. 532
Chicago foundations 376
Chimneys:
  Anchor-bolts in steel chimneys..... 64
  Reinforced concrete chimneys of Portland General Electric Co. and of Tacoma Smelting Co. 57, *120, 205
  Steel. Design of self-supporting chimneys. Concrete foundations. By J. D. Adams *64
Cholera in Germany 275, 361
Chords. Length of sides of regular polygons. By C. L. Bogert.....*357
Cistern, Reinforced concrete, for fire protection service. By Edward Godfrey .....*
Civil Engineering. By G. J. Fieberger. Eng. Lit.
Coal, Anthracite, as locomotive fuel.....
Coal briquetting plant of Western Fuel Co., Oakland, Cal. .....
Coal handling:
  Elevating bucket conveyor for coaling steamers of American Line.....*
  Missouri River power house, Kansas City. By F. G. Cudworth .....
  Smith tilting cradle for loading box cars *1
  Syracuse Lighting Co. Locomotive shovel crane .....*
Cofferdams:
  Construction of. By T. P. Roberts.....
  Crib cofferdam of the Electrical Development Co., Niagara Falls.....*
Coke, Manufacture of, and Other Prepared Fuels. By John Fulton.
    Eng. Lit.
Cold storage .....
Collisions between vessels and drawbridges .....
Collodial matter in sewage effluents.....
    412, 414,
Compressed air. Excavating small tunnels in soft ground by pneumatic process, Boston. By F. I. Winslow 41,
Concrete:
  Decoration of concrete with colored clays. By H. C. Mercer.....*687,
  Expansion and contraction due to temperature changes.....
  Fire resistance:
    Effect of heat upon the crushing strength and elastic properties. By I. H. Woolson *35,
    Fire resistance and heat conductivity. Tests to determine .....
    Fire tests by joint committee of several organizations .....
  "Flow" of concrete under pressure. Tests at Columbia University. By I. H. Woolson.....*
Freezing, Safeguards against, in building construction *240,
Hair cracks, crazing or map cracks on concrete surfaces. By Albert Moyer
Permeability. Tests of blocks under high heads of water at Borossa dam .....
Sand analyses at St. Louis. By R. L. Humphrey .....
Specifications, German, for designing, constructing and testing concrete structures. By L. S. Moisseiff.....
Strength of concrete with oyster shell aggregate. By Wayne Cunningham.
Tests at St. Louis Exposition. By R. L. Humphrey *300,
Voids in broken stone, Reducing. By E. J. McCaustland .....
Concrete block construction:
  Architects and block construction..553,
  Blocks from refuse destructor clinker made at Swansea, Wales .....
Breakwater at Colborne Harbor, Ontario. By J. M. Hogan.....*158
Chicago ordinance regulations.....
Fireproof and damp resisting qualities. By C. P. Myers, N. F. Palmer.... *
Manufacture and use of blocks. By F. W. Hagloch .....
Manufacture and use in building construction (Engineering News Competition):
  First prize paper. By H. H. Rice...
    341, 355
  Second prize paper. By W. M. Torrance *363, 458
  Extracts from various papers.....
    *427, 454, 546
Philadelphia, Rules and regulations in.
    406, 413
Concrete Block Machine Manufacturers' Association .....
Concrete block shelter houses. By J. S. Worley .....
Concrete mixing:
  Breakwater at Colborne Harbor.....
  Foster-Armstrong Piano Works.....*240
  Jerome Park reservoir, New York.....*208
  Page portable open-drum mixer.....*613
  Proportions used. By H. H. Rice..... 343
Concrete molds:
  Breakwater at Colborne Harbor.....*159
  Early patents on molds for building blocks. By W. M. Torrance *264
  Pier forms at Cannington viaduct.....*453
  Stamped metal forms *483
Concrete revetment for Niagara cliff.....*465
Concrete scow *159
Concrete spreader, Briggs' device.....*243
Condenser for shaft-sinking pumps and mine pumps *260
Construction materials, Waste of, in engineering work .....
Consumption, Spread of, as affected by railway travel. By C. B. Dudley..
    399, 414
Contracts and contractors:
  Cuban Government contract award a warning to American contractors..
  Engineering contracts. Essentials of a well-drawn contract. By J. A. L. Waddell .....
  Government work, Contracts for.....
    437, 461, 515, 577,
  Guarantees, Annual .....
  Penalty clause suit of Roebling Co....
Conveyors:
  Portable gravity tramways and small cars in stopes in South African mines .....
  Traveling conveyor for placing back filling over roof arch of Washington tunnel .....
Copper sulphate treatment. (See Water purification.)
Cornell University .....
Cost Data, Handbook of. By H. P. Gillette.....Eng. Lit.
Crane, Locomotive, at coal handling plant .....
Creosoting works of the Western Ry. of France .....
Crosswalks for macadam pavements. By W. G. Stewart .....
Cuban Government contract .....

*refers to illustrations and † to insets.

Culebra Cut at Panama *632
Curves:
Connecting two curves with a tangent. By A. S. Hobby..... 18
Setting out and checking circular and transition curves *513

D.

Dams:
Apple River Power Co., Riverdale, Wis. *374
Earth dams with concrete core walls. By Clemens Herschel 247
Gatun dam on Panama canal. By C. M. Gillette *83
Lake Avalon dam near Carlsbad, N. M. Failure. By E. C. Murphy *9
Meachen, W. Va. Pile foundation with movable dam. By G. S. Walker *100
Masonry, Stresses in high dams of short spans. By G. Y. Wisner and E. T. Wheeler *141
Masonry-in-concrete, Brick-faced, Swansea, Wales 103
Masonry dams in narrow rock canyons, with wing dams. By C. R. Steiner..*253
Mermentau River, La. Movable dam and lock *321, 385
Movable dams:
Pile foundation and method of calculation. By G. S. Walker.....*100
Rice Irrigation & Improvement Association, Mermentau River, La....*321
Pathfinder dam, Wyo. Analysis of stresses. By G. Y. Wisner and E. T. Wheeler.....*144
Sherburne, N. Y., Failures. By E. F. Musson 274
Spillway, Siphon *126
Steel dams:
Helena, Montana 266
Structural steel dams. By F. H. Bainbridge *323
Sydney, N. S. W. 104
Davis, G. W., Biographical sketch of...*259
De Nevers, Charles 276, 517
Derailing device for sidetracks.....*513
Derricks:
Dumping cars and wagons.....*196
Traveling derrick in Washington tunnel *209
Dirt as a source of disease 89, 97
Diving bell of 4,000 years ago..... 378
Diving rod, Use of, in Germany..... 386
Docks, Construction and maintenance of. Cost of ore docks. Record of docks on the Great Lakes 432
(See also Dry docks.)
Domes:
Naval Academy Chapel 28, 29
Reinforced concrete, Railway station at Antwerp, Belgium *96
Drains, House, in Chicago. Use of vitrified tile sewers. By P. L. Hedrick *458
Drawing, Dictionary of mechanical. By G. H. Follows.....*88, *151, *256
Drawing board, Handy, for field use. By E. B. Darlington *129
Dredge bucket, Williams clam-shell.....*170
Drill boats *1, *160
Drilling:
Deep drill hole in South Africa..... 349
Rotary drill core from steel I-beams.*579
Drills:
Pneumatic drill "Little Jap".....*146
Water hammer drill 386
Dry docks:
Comparative merits of floating and graving docks. Report of Mass. Harbor Board 70
Floating dock at Cavite, P. I., Tests. By A. C. Cunningham, L. M. Cox..*585, *586
Lorain, Ohio 337
Southampton, England 559
Dump wagon, Briggs *243
Dust collector for the Montreal Municipal asphalt plant. By J. R. Barlow *335
Dynamite carrying steamers in canals. By J. R. Wemlinger..... 695

E.

Earth pressures and retaining walls. By H. P. Boardman *166
Earthquake in Calabria 281
Earthwork computations, New form of procedure for. By C. W. Crockett. 654
Earthwork shrinkage 604
Earthwork Tables. By R. S. Henderson. Eng. Lit. 650
Efficiency, Indiscriminate use of the word. By H. L. Smith. Eng. Lit. 388
Electric generators:
New induction generators 4
Size and number of units in power stations 327
Sparking and design of direct-current machines 3
Tests of a Curtis steam turbine generating set 79
Electric iron smelting processes and the failure in Sweden..... 601
Electric lamps, Incandescent:
Light signals on electric railways. By L. H. Thulien *83
New carbon filament for lamps. By J. W. Howell 4, 41, 45
Electric lighting:
Columbus, Ohio, municipal plant..... 299
New York, Estimates for municipal plant 9
Electric power plants:
Apple River Power Co., Wisconsin...*374
Brigham City, Utah. By W. P. Hardesty *235
California Gas & Electric Co., De Sabla, Cal. By J. D. Galloway *131
Central light and power stations in the U. S., History of 331
Cost of transmission in electric railway problems, Relation of variable load to. By S. W. Ashe 34
High-power surges in distribution systems of great magnitude. By C. P. Steinmetz 7
Long Island R. R., Installation of electric traction *445
McCalls Ferry, Pa., Proposed plant.. 496
Missouri River Powerhouse, Kansas City. By F. G. Cudworth.....*400
Nevada Power, Mining & Milling Co. By E. Prince 16
N. Y. C. & H. R. R. R. at Yonkers and Port Morris *506
Electric power plants: (Continued.)
Niagara Falls power plant of the Electrical Development Co. of Ontario. *475, *561, 577
Size and number of units in generating stations 327
Sub-station, Portable, at Belmont Park race track *446
Winnipeg, Manitoba 436
Electric railways:
Berlin Rapid Transit 546
Chicago, Ordinances presented to the Council 385
Cost of transmission of energy, Relation of, to variable load, illustrated by load diagrams of Brooklyn Rapid Transit Co. By S. W. Ashe. 34
Costs of construction of narrow gage railway, of motor car railway. By W. D. Marks 68, 73
Crossing of electric and steam railways, Protection, on the United Rys. of Baltimore 559
Direct-current traction at higher voltage. By F. J. Sprague 671
English street railway construction. By Joseph Owen 250
Gas-power single-phase railways..... 473
N. Y. C. & H. R. R. R., Equipment of New York terminal lines *490
New York subway system, Heat conditions in. Preliminary report by G. A. Soper 42, 491, 493
Philadelphia Rapid Transit..... 699
Signaling systems, Automatic. By L. H. Thulien *32
Single-phase:
Atlanta-Marietta, Ga., line 361
Westinghouse system, Work accomplished with. By C. F. Scott 358
Surface contact system on trial in Dresden 224
Third rail, Protected bottom-contact conductor rail on N. Y. C. R. R..*501
Three-phase traction discussed by A. I. E. E. 2
Toledo Urban & Interurban Ry. Permanent way and structures. By J. S. Worley *38
Electrical devices for deep borehole surveying. By H. F. Marriott..... 91
Electrical instruments 4
Elevated railways:
Chicago, Freight and express business. 104
New York, Accident at 53d St. curve. 281, 361
Elevator, Bucket, for raising ore from mine *598
Elevator accidents:
Buffalo, Chamber of Commerce building 177
Phila., Land and Title building.....80, 170
Elevators:
Mountain elevator on a Swiss mountain 497
Trinity Building, N. Y. C. Tests of plunger elevator plant. By A. J. Herschmann *635
Engineering and architecture, Fact and idea in. By R. S. Buck..... 674
Engineering Building, Reports of committee *615
Engineering contracts. By J. A. Waddell 607
Engineering departments, Scope of reports of.....Eng. Lit. 387
Engineering News:
Contributors, Hint to. By T. G. Dabney 579
Files of, in various cities.....Eng. Lit. 643
Index, 1900-1904, published...Eng. Lit. 643
Prize papers on concrete block manufacture.341, 355, *363, *427, 438, 454, 546
Engineering schools:
Cornell University 470
Lecture method of teaching, Abuse of. 171
Mathematics for engineering students should be taught by engineers..... 227
Notes from.....248, 360, 470, 552, 582, 613
Purdue University 552
University of Michigan 117, 613
University of Wisconsin 582
Washington Barracks 559
Worcester Polytechnic 582
Engineers:
Architectural building work, Field for engineers and contractors in 310
College education. By Wm. Kent.413, 416
Commissions from manufacturers and supply men. "Pernicious forms of graft" 123, 172, 174
Compensation of engineers in the government service at Panama and Manila 171, 229, 316
Equipment. Reading knowledge of French and German.....Eng. Lit. 179
Legal liability 493
Lives of the Engineers. By Samuel Smiles.....Eng. Lit. 395
Opportunities for graduates in the government service. By J. F. Hayford 33
Overcrowding of the profession..... 413
Proverbs for engineers.....378, 493
Reading knowledge of French and German .....Eng. Lit. 179
Services, Curious way to engage..... 73
Testing engineer, The. By C. B. Dudley 67
Training of engineers in the science of economic production 74
Value of an engineer's services 41
Erasing machine 170
Excavation:
Buffalo Harbor, Subaqueous rock..... *1
Culebra cut in the Panama canal.....*632
Handling material by means of derrick dumping cars and wagons, Grant Park, Chicago *196
Port Colborne harbor, Ontario. Rock excavation. By J. M. Hogan.....*158
Excavators:
Cross-cut machines for drainage ditches *250
Submarine rock excavator. By C. G. Hepburn *201
Explosion of 175-ton blast on Penn. R. R.*677
Explosives:
Production and value, 1840 to 1900... 490
Regulations for the transportation of explosives.....533, 555
Transportation and handling of explosives by railways 488
Expositions:
Floating industrial, proposed 381
Industrial, at Santiago, Chile..... 381
Milan, of 1906, Prizes offered..... 559
Eyebar manufacture, Development of. By J. H. Springer, C. P. Buchanan, C. L. Strobel, G. C. Henning..... *175, 464, 579, 632

F.

Falsework at Budapest chain suspension bridge *193
Fans, Theory and Practice of Centrifugal and Axial. By C. H. Innes..... Eng. Lit. 179
Fastening for shear and tension bars in concrete beam reinforcement.....*327
Fence posts, Reinforced concrete, molded in the ground *66
Ferry steamers, Car Transfer, at Peshtigo, Wis., and South Chicago 202
Filing records in city surveyor's office. By Fred Gabelman 59
Filters. (See Sewage purification; Water purification.)
Fire at Hoboken terminal 154
Fire drill in factories, Importance of. By H. F. J. Porter 665
Fire extinguishers, Dry powder, Analyses of. By J. R. Freeman 630
Fire insurance policies as an incentive to water-works improvement 379
Fireproof construction:
Method of reducing the nation's fire loss. By Alcide Chausee..... 296
Theater construction. By J. R. Freeman *624, 631
Theater saved by automatic sprinklers. 693, 697
Fireproofed wood:
New York ordinance to discontinue use of 641
Tests at the Insurance Engineering Experiment Station. Report by C. L. Norton 353
Fire protection, Charges for private..... 675
Fire services, Private, Necessity for metering 312
Flange list for marine work. By L. D. Loveskin 396
Floods in the Southwestern U. S..... 96
Floors:
Asphalt or coal tar concrete for basement and ground floors. By Edward Atkinson 106
Concrete floor in Jerome Park reservoir *290
Hanger, Removable, for concrete floor forms *145
Kahn hollow tile, Tests. By R. L. Humphrey *304
Siegwart system, Tests. By R. L. Humphrey 304
Florida Everglades. By S. L. Lupfer....278
Flumes:
Cal. Gas & Electric Cor., Timber. By J. D. Galloway *132
Puget Sound Power Co., Timber..... 377
Flywheel, Computing speed of..... 358
Foundations:
Chicago, Development 376
Spread foundation of reinforced concrete *77
Franchises, Street railway, Term of..... 580
Francis, Charles 276, 517
Freight stations:
Alexandria, Va., yard. By W. A. MacCart *583
Cincinnati, Ohio *593
Frog crossing with continuous rails.....*145
Fuel, Government investigations of..... 215
Fuel economy of gas-producer power plants where heating is necessary. By J. H. Kinealy 242

G.

Gage for lining and checking curves in railway track *513
Gaging streams by chemical means. By W. L. Butcher 371, *634
Garbage collection:
Cost of, in various cities 272
Philadelphia, Bids 23
Garbage disposal:
New York City, Bids and possibilities. 253
Phil., Contract awarded..... 96
(See also Refuse destructors.)
Gas engines:
Auxiliary and reserve, for the transmission system of the Cal. Gas & Electric Co.....23, 280
Future of the internal combustion engine as a prime mover. By C. E. Sargent 633
Growth of large engines in Europe. By R. E. Mathot.....*216
Marine engines for auxiliary power on the Pacific Coast 170
"Mechanical efficiency" in the gas engine 121, 463
Test of a small-sized gas producer and gas engine at Poughkeepsie, N. Y., water-works 95
Gas-holder, Construction of the modern *421, 437
Gas mains:
Cement joints for 621
Prevention of stoppages in services, meters and house pipes during cold weather. By Irvin Butterworth.163, 171
Gas producers:
Economy of gas producer power plants where heating is necessary. By J. H. Kinealy, G. W. Jeffery.....242, 380
Test of a small-sized producer at Poughkeepsie, N. Y..... 95
Gases in pipes, Pitot tube for measuring velocities of. By R. Burnham.....*660
Gasket for high-pressure steam and air pipes, German *354
Gaynor and Greene, Extradition of.....361
Geology, Structural and Field. By James Geikie .....Eng. Lit. 529
Glass, Wire, Fire tests by British Fire Prevention Committee 362
Gold, An instrument for locating, wanted 416
Government service, Opportunities for engineering graduates in. By J. F. Hayford 33
Governor, Lombard, and Doble nozzle for 5,000-KW. generator unit, de Sabla power station, Cal. By J. D. Galloway *135
Graft in engineering 123, 172, 174
Granular and lump material, Storage of. By W. E. Hunter and J. S. Myers.. *80
Grapple, Farrington, for lifting stone blocks *70
Greene, Andrew H., Memorial to..... 337
Grinding machine for preparing test specimens 47
Guerard, Adolphe, Biographical sketch of.*261
Guns:
Bullets, Velocity of 672
16-inch coast defense 47
Gutter and crosswalks for macadam pavements. By W. G. Stewart.... 308

H.

Handling of material for filling Grant Park, Chicago *196
Hanger attachment for concrete beams and ceilings *226
Hanger for concrete floor forms, Removable *145
Harbor at Goteborg, Sweden 385
Headlight, Edwards electric, with turbine attached *140
Heat insulators, Tests of, in England.... 154
Heating and ventilation:
Central station, hot-water heating systems, Design of. By J. D. Hoffman. 75
Hot air, Possibilities in heating with. By R. S. Thompson 31, 42
New York subway, High temperatures in 42, 491, 493
Hill, John W.....461, 466, 493
Hoist, Water, Automatic electric, at mine *582
Hopper work, Problem in detailing. By C. T. Lewis, H. R. Thayer, E. L. Odlum *75, *205
Hose and hydrant threads, Report on.... 308
Hunter, W. H., Biographical sketch of..*261
Hydraulic engine at naval coaling station, Bradford, R. I. *127
Hydraulic mining practice, Notes on. By R. L. Grider *78
Hydraulic Tables. By G. S. Williams and Allen Hazen .....Eng. Lit. 283
Hydrology of the State of New York. By G. W. Rafter.....Eng. Lit. 391

I.

Ice-making 620
Industrial establishments, Organization of the operative force in. By H. F. J. Porter 638
International architectural competition.. 281
International Railway Congress..... 103
International Waterways Commission....*328
Interstate Commerce Commission, Report 689
Iron and steel:
Brittleness .....Eng. Lit. 284
Coatings, Report on preservative..... 27
Corrosion, Relative resistance to, of wrought iron and steel 328
Crystallization of Iron and Steel. By J. W. Mellor.....Eng. Lit. 528
Electric smelting process and the failure in Sweden 601
Manufacture of wrought iron 328
Prehistoric iron 443
Protection of paper and paint. Experimental investigation. By L. H. Baker 99
Substitution of iron for steel..... 334
Irrigation:
Canals:
Locating tangents so cut and fill will balance. By C. L. Swain, Y. L. Havens, J. W. Hays, M. H. Wright, 18, *149, 310
Slips and cracks in a high embankment in India. By A. H. Bastow.. 205
North Dakota 362
U. S. Reclamation Service.....70, 624

K.

Kraus, J., Biographical sketch of.....*332

L.

Labor question:
Industrial establishments, Organization of the operative force in. By H. F. J. Porter 638
Minnesota, Northern, Labor market in. By W. C. Weeks 439
Rates of wages and cost of living in the U. S., Changes in 333
Sanitary engineering in the South and the labor question. By J. N. Hazlehurst, G. B. Hazlehurst, W. C. Weeks 294, 309, 357, 439
Lake Erie, Opposition to raising level of. 379
Landslide at Thompson River, B. C..... 177
Lecture method of teaching engineering subjects, Abuse of 171
Leveling instrument, Fennel prismatic...*606
Library, Municipal, at Frankfort, Germany, American Section for..Eng. Lit. 179
Lighthouses:
Bermuda Islands, at Gibb's Hill. By R. A. Cummings and C. W. Reinhardt *223
History of. By R. A. Cummings 212
Lighting of mill buildings. By C. A. Raymond 94
Limestone output in N. Y. State in 1904 177
Loading box cars with coal by means of Smith tilting cradle.....*119
Loading hopper, for car unloading.....*243
Lock, Movable, for dam.....*321
Locomotives:
Compound consolidation freight with superheater *537
Duplex compound, for heavy grades, Northern Ry. of France..... 672
Electric:
52-ton, Pacific Electric Ry, Co..... 47
London, Metropolitan Ry..... 378
N. Y. C. & H. R. R. R..... 504
Single-phase, Westinghouse *16
Fuel, Anthracite, Ought it to be used? 74
Hauling power of a geared locomotive. 602
Hollow firebrick arch, C. & N. W. Ry..*200
Indian Ry., Standard designs..... 193
Modern Locomotive Engineering. By C. F. Swingle.....Eng. Lit. 645
Superheater on compound consolidation freight locomotive *537
Switching locomotive, L. S. & M. S. Ry. 103
Tank:
Gt. Western Ry., England..... 47
Madrid, Saragoss & Alicante Ry..... 641
Panama Ry..... 465
Water softening. By T. W. Snow..... 510
Long, T. J., Biographical sketch of.....*580
Loose leaf system for estimate sheets.... 380

*refers to illustrations and † to insets.

M.

McDonald, John A., Report concerning.. 276
Machine Design. By A. W. Smith. Eng. Lit. 650
Machine screw sizes and threads....691, 694
Magnetic switch controllers on electrically-operated automatic ore unloaders at Lorain, Ohio. By R. I. Wright *481
Maintenance-of-way expenses on American railways 85, 97, 172
Malaria and yellow fever. By Ronald Ross 135, 147
Manila municipal improvements. By J. F. Case 411, 414
Mapping the location of buildings on city streets. By T. R. Ansit, C. E. Smith, P. Dodridge, T. B. Shertzer, B. L. Cushing, S. E. Washburn.... *124, *173, 229, *310, *380
Mathematics for engineering students taught by engineers 227
Mechanical Engineering. By C. M. Sames .....Eng. Lit. 649
Mechanics of Materials. By Mansfield Merriman .....Eng. Lit 389
Mensuration, Problem in 97
Metallurgy, Handbook of. By Carl Schnabel .....Eng. Lit. 643
Milan Exposition of 1906, Prizes offered. 559
Mining, Placer. By R. L. Grider..... *78
Mortars:
Comparative tensile strength of mortars made of various sands. Tests at St. Louis. By R. L. Humphrey. 301, 309
Effect of clay and loam on the strength of Portland cement mortar. Investigation at University of Kansas. By W. C. Hoad 140
Mosquito extermination:
Extermination in the U. S..... 315
Mobile, Ala. Report on work done.. 309, 315
Protection against yellow fever at Helena, Arkansas. By F. H. Wright 224, 227
Motor vehicle, New type, to run on track or road 47
Mouras automatic scavenger 281
Moving sidewalks 693
Municipal loan purposes and periods in England and the U. S..... 462
Municipal ownership:
Investigation of, in America and Europe, by National Civic Federation..... 459
Steamers on River Thames, London.... 48
Street railways of Liverpool, England.. 496
Telephones in Gt. Britain and the need of public regulation in the U. S.... 379
Winnipeg, Canada 515

N.

National Fire Protection Association..251, 316
Natural gas as a steam boiler fuel..... 622
Navy, U. S.:
Men, not ships, needed..... 601
Report and recommendations of Secretary Bonaparte 693
Work of the Bureau of Yards and Docks 691
New England Water-Works Association.. 305, 309
Niagara Falls, Plea for the conservation of 668
Noble, Alfred, Biographical sketch of....*262

O.

Oil and Gas, Law Relating to. By W. W. Thornton .....Eng. Lit. 54
Oil fields of Baku 281
Ore-carrying records on the Great Lakes. 420
Ore-unloading machines, Hulett electric. By R. I. Wright *125, *481
Organization chart of a large contracting firm *100

P.

Pacific Coast Engineering Congress....46, 57
Palm leaf stalks, Tests of the strength of. By C. H. Snow *74
Park system for Chicago..... 386
Parsons, W. B., Biographical sketch of..*262
Patterson, T. L., Biographical sketch of. By J. C. Trautwine.....*621
Pavements:
Asphalt. Richardson's book discussed by Condit and Whinery....Eng. Lit 50
Asphalt paving plant, Montreal. By J. R. Barlow *335
Macadam, Gutters and sidewalks. By W. G. Stewart 308
Oil on macadam roads and oil-asphalt streets in California. By T. F. White 314
Repairs, Brooklyn Bureau of. By E. J. Fort 318
Penalty clause suit, Legal decision..... 356
Pennsylvania, Municipal scandals in..... 74
Pepperman, W. L., on Panama Canal Commission *63
Percentage basis for engineering work... 603
Philadelphia, Criminal prosecutions in... 80
Philippine Islands:
Labor conditions in. By J. W. Beardsley, T. M. Ripley.....538, 553 603
Manila, Municipal improvements. By J. F. Case 411, 414
Sanitary conditions as affecting contracts for works. By E. C. Carter....544, 553
Pickling solutions, Influence of arsenic in. By C. F. Burgess 352
Pier shed frame, Rapid erection of.....*296
Piles:
Calculating the cubical contents of piling. Table proposed by E. O. Faulkner 170
Concrete, Reconstruction of viaduct foundations, Norfolk & Western Ry.*441
Foundation for a movable dam at McMechen, W. Va. Method of calculation. By G. S. Walker.....*100
Reinforced concrete, Corrugated, for building *594
Reinforced concrete, for bridge pier foundations 605
Steel, in foundation wells, Chicago.354, 613
Steel sheet piling:
Hillsdale reservoir dam.....*546
Use of *545
Pipe cleaner for small pipe 362
Pipe flanges for standard steam pipe for marine work. By L. D. Lovekin... 596
Pipe galleries and tunnels. (See Subways.)
Pipe joints:
Cast iron hub for connecting steel and wood pipes. By W. P. Hardesty....*237
Cement joints for gas mains. Experience of various companies and cities 621
Leaded joints for lap-welded steel and wrought iron pipe. By Edward Prince *145
Locking bar joints for 32-inch steel main, Sydney 126
Malleable iron fitting for butt joints in wood stave pipe. By W. P. Hardesty *238
Melting lead joints by means of electric currents 151
Pipe laying, Cost, Atlantic City. By Kenneth Allen 274
Pipe line refrigeration. By J. E. Starr.. 640
Pipe sewers, Breaks in 471
Pipe-thawing by electricity, Westinghouse apparatus 641
Pitkin, A. J., Biographical sketch of.....*552
Pitot tube for measuring velocities of gases in pipes. By R. Burnham....*660
Placer mining. By R. L. Grider..... *78
Plane-table, Simple, and its results.... 75
Platforms, Concrete, for railway stations. 433
Plumbing in Chicago, Tile house drains. 413, 458
Poles, Iron, for telephone wires..... 579
Polygons, Table for finding length of sides *357
Post Office Building, New, N. Y. City.... 47
Posts, Tests of reinforced concrete.....*215
Power plants. (See Electric power plants.)
Projectiles, Action of capped armor-piercing. By E. K. v. Thurnwerth..*346
Propellers:
Design of screw propellers. By Horace See *471
Tests of wooden propellers. By W. F. Durand 557
Proverbs for engineers 378, 493
Public Health Engineers' Association.... 584
Pumping engine, Sewage, Boston, at Calf Pasture *11
Pumping plant at Buffalo, Recommendations against 552, 553
Pumping sand by compressed air at plant of U. S. Silica Co. By L. I. Wightman *587
Pumps:
Air lift, for deep wells 312
Centrifugal. By E. R. v. Grünebaum. Eng. Lit. 648
Compressed air pumping on the Starrett system 384
Electrically driven flow-duty centrifugal pumps compared with steam-driven high-duty vertical plunger pumps.. 352, 553
Steam turbine, De Laval, Tests of, at Brooklyn and Rochester 77
Purdue University 552
Push cart for transporting concrete *359

Q.

Quellenec, E. M., Biographical sketch of..*262

R.

Rail-bond, Inductive, for track rails on alternating-current signal system. By L. H. Thullen *33
Rail fastenings:
Carnegie steel tie, B. & L. E. Ry.....*202
Percival concrete tie *349
Rail grinding machines 170
Rail joints, Repair of worn, Western Ry. of France 601
Rail sections, British standard. Specifications *84
Rails:
Breakage of English bull-headed rails. By Thomas Andrews *435, 437
Discussion at Society meeting 29
English street railway construction. By Joseph Owen 250
Prices of American rails in Australia. 461
Street railway rail on paved streets .. 465
Railway accidents:
Boston & Maine R. R. 583
N. Y., Chic. & St. Louis 177
Statistics 103, 444
Railway curves:
Setting out and checking circular and transition *513
To connect two curves with a tangent. 18
Railway improvements and betterments. 228
Railway location:
Alinement, Problem in improving. By W. W. Urquhart, C. E. Bengler, R. W. Gay, W. N. Frickstad..438, 517, 633
Ontario wilderness, Experience in. By J. A. Macdonald 633
Value of a location that shuts out a competitor. By Walter Watson, S. A. Wallace, C. P. Howard..492, 579, 695
Railway maintenance-of-way expenses on American railways 85, 97, 172
Railway rates:
Experiment in rate-making on an interurban railway. By W. D. Marks 448
Figures from Poor's Manual for 1905. 461
Government Regulation of Railway Rates. By H. R. Meyer. Eng. Lit. 533
Restrictive Railway Legislation. By H. S. Haines.....Eng. Lit. 533
Railway stations and terminals:
Alexandria, Va., Freight yard terminal. By W. A. MacCart *583, 696
Antwerp, Belgium station, Dome of reinforced concrete *96
Chicago, New terminal station 459
Cincinnati, Ohio, Freight station *593
Grand Central, New York, Reconstruction details *503
Hoboken, N. J., Lack. R. R. terminals destroyed by fire 154
New Orleans, New terminals 23
Platforms, Specifications for concrete.. 433
Study of railway terminals at the University of Chicago 379
Suburban stations, platforms and canopies on terminal lines of N. Y. C. R. R. *502
Railways:
Australia, Statistics 192, 614
Canada-Atlantic Ry. sold 361
Canton-Hankow Ry. acquired by Chinese government 264
Chic. & N. W., Heavy traffic on single track 525
Cincinnati Southern. Operation of a single-track railway under the automatic block system. By H. M. Waite 322
Railways: (Continued.)
Erie:
Anniversary 525
Purchase of C., H. & D.—Pere Marquette system 386
Florida East Coast, Key West Extension *407
Glasgow & Southwestern 104
Grand Trunk Pacific, Contracts awarded 280
India, Mileage 170
Light railways:
Comparison of steam and electric motive power on a light traffic railway in Iowa 102
Estimates of cost of narrow gage railway and motor car railway. By W. D. Marks 68, 73, 99
Long Island, Installation of electric traction *445
Nash., Chat. & St. Louis, Grade reduction 362
New South Wales, Statistics 277
N. Y. C. & H. R., Electric equipment and reconstruction of New York terminal lines and Grand Central Station .....†499
Penn. low grade freight line from Harrisburg to Atglen, Pa.....*677
Sierra Leone 281
South Australia 614
Switzerland, Probable electric traction 523
Taff Vale, England, Steam motor cars.*350
United States, Statistics for 1904 ..195, 472
Western Pacific, Proposed line 361
Rainfall:
Record-breaking rate of run-off on small streams at Ithaca, N. Y. By E. C. Murphy 576
Variation of rain in various places of the Philippines, the Antilles and the U. S. *542
Randolph, Isham, Biographical sketch of *263
Reclamation Service, U. S. 70, 624
Records:
Loose leaf system for estimate sheets. 380
Methods of filing records in a city surveyor's office. By Fred Gabelman 59
Reflecting circle, Principle of the 311
Refrigeration and refrigerating machinery. By J. E. Starr and others.... 619, 620, 640
Refuse destructors, British type, at Sacramento, Cal., and Westmount, Quebec 337
Regenerating system, Rateau, for utilizing low-pressure steam turbines at Dusseldorf, Germany *151
Regulating valves, Water pressure.....*688
Reinforced concrete:
Compression tests, Uniform loading in.*215
Concrete-Steel. By W. N. Twelvetrees. Eng. Lit. 201
Discussion at Pacific Coast Engineering Congress 57
Factory building at Chariotte, N. C. .*606
Fastening for shear and tension bars in concrete beam reinforcement ..*327
Freezing in concrete building construction, System of safeguards against. *240, 252
Hennebique system tested at St. Louis. By R. L. Humphrey 301
Kahn system tested at St. Louis. By R. L. Humphrey *301
Moment capacity of T-beams, Diagram for. By C. E. Young..... 518
Mushroom system proposed by C. A. P. Turner *383
Piles for building foundation *594
Report to American Society for Testing Materials 22
Reservoir at Fort Meade, S. D. By S. H. Lea *680
Rods, Plain and patented, Relative advantages of. By L. White 99
Shop construction 623
Spacing of reinforcing bars in concrete floor slabs 254
Tests of cement and concrete at St. Louis. By R. L. Humphrey ..*300, 309
Tests of the efficiency of vertical stirrups in beams at Bush Terminal Co., Brooklyn *5
Tunnel for water supply, Salt Lake City *639
Unit frame reinforcement system of concrete steel construction *230
Warehouse design. By F. W. Keyser, E. L. Heidenreich, C. A. P. Turner.*382
Reports of public engineering departments, Scope of.....Eng. Lit. 387
Reservoirs:
Bloomington, Ill., Reinforced concrete 406
Fort Meade, S. D., Reinforced concrete. By S. H. Lea.....*680
Jerome Park, New York. Method and cost of concreting. By H. P. Gillette *298, 309
Reinforced concrete, made watertight. 465
Retaining walls and earth pressures. By H. P. Boardman, Chas. Worthington, J. S. Fielding *166, *519
Revetment, Concrete, Niagara River Gorge *465
Ripley, Joseph, Biographical sketch of..*263
River gaging by chemical means. By W. L. Butcher 371, *634
Rivers:
Columbia, Improvement 46, 75
Irregular flow in humid prairie states. By F. W. Hanna 118
Kennebec River, Maine, Profile work. By A. D. Butterfield and G. M. Brett 213
Right and left bank of streams. By F. Hodgman, J. B. Brook, W. H. Kimball, J. H. Wheat, H. M. Payne, C. L. Wood.....440, 465, 579, 633, 695
Riveting:
Notes on workmanship. By A. J. Himes *416, 604
Tightening loose rivets in structural work. By J. S. Sewell, A. V. Bouillon, C. C. Huribut, R. W. How, G. C. Henning, John Van Brunt.. *357, 381, 415, 439
Rivets, Overheating or burning of..... 492, 517, 632, 671
Roadmasters' and Maintenance of Way Association 297
Roads:
Anti-speeding devices, Glencoe, Ill..... 398
Oil on macadam roads in California. By T. F. White 314
Roads: (Continued.)
Roadway for contractors' wagons, Grant Park, Chicago *197
Sprinkling with motor cars..... 699
Top dressing for macadam 420
Roof framing, Inskip's tables for..... Eng. Lit. 389
Roofs:
Modified saw tooth roof. By M. S. Ketchum *551
Repairing methods 434
Solid modern slab construction without purlins. By Charles Worthington, W. I. Bishop *149, 205
Ross, David W., on Panama Canal Commission *63
Run-off on small streams, Ithaca, N. Y. By E. C. Murphy 576

S.

Sands for cement mortar 300
Sanitary engineering in the South and the labor question. By J. N. Hazlehurst 294, 300
Sanitary science as practiced in the Japanese Navy 356
Saw, High-duty cold, with teeth of high-speed steel *412
Scow, Concrete, on breakwater construction *159
Screw propellers, Design of. By Horace See *471
Screw sizes and threads, Standard..691, 694
"Sea mills" of Cephalonia. By W. P. Mason *352
Septic tanks. (See Sewage purification.)
Sewage farming at Reading, England... 577
Sewage purification:
Bradford, Eng. Grease extraction. Report by J. Garfield 128
Burnley, Eng. Septic tanks and double contact beds 425
Canterbury, Eng. Covered sewage sludge beds 104
Colloidal matter in sewage effluents. Studies made by G. J. Fowler at Manchester, Eng. 412, 414, 603
Columbus, Ohio. Details of works. By Julian Griggs 313
Contact beds and percolating filters, Relative merits of. By Bostock Hill 411, 413, 603
Intermittent filtration in England and in America 171
Litigation. Cameron Septic Tank Co. vs. Saratoga Springs 412
Manchester, Eng. Year's operations... 472
Mouras automatic scavenger, alleged antecedent of the septic tank 281
Notes on sewage disposal. By Baldwin Latham 666, 669
Reading, Eng. Sewage farming 515
Septic tank infringement suit, Pawtucket, R. I. 227, 230
Sheffield, Eng. Proposed settling tanks, contact and storm beds 597, 601
Sewerage:
Chicago, Progress in 491
Manila, P. I., Bids asked 337
Sewer cleaner and bucket *336
Sewers:
Breaks in pipe sewers discussed by Alex. Potter. Inspection of pipe... 471
Brick, Laying in quicksand, St. Louis. 136
Cleaning, Shannon bucket *336
Specifications, Commendable 148
Shaft sinking, Rapid, at a Nova Scotia coal mine. By W. H. Hyde, H. S. Patterson 295, 300, 357
Shell, Action of capped armor-piercing. By E. K. v. Thurnwerth *346
Shield, Roof, for tunnel work on Metropolitan Ry. of Paris. By Rene Bonnin *324
Shipping. International action for the protection of traffic on the high seas 17
Shops and manufacturing plants, Design of 379
Sidewalks, Moving 693
Signal lamps, Design, construction, efficiency and maintenance of 408
Signals and signaling:
Automatic signaling on electric railways. By L. H. Thullen *32
Block system on single-track railway. By H. M. Waite 322
Interlocking plants, Cost of maintenance, operation and inspection compared with the cost of stopping trains. By J. A. Peabody 372
Light signals, Electric. By L. H. Thullen *33
Siphon spillway for dams *126
Slide rules:
Computing bevels with the slide rule. By C. N. Haggart 124
Earthwork computations. By C. W. Crockett 654
Wilds' circular, for reducing stadia readings. By A. L. Bell *486
Sluice, Bedrock, in hydraulic mining. By R. L. Grider *78
Smoke prevention:
Municipal control of smoke at Indianapolis. By R. P. King....227, 229, 348
New argument against 251
Prosecutions in Philadelphia 177
Smoke vents in theaters. By J. R. Freeman *625, 693
Snow compressing machine, Farquhar. *94
Snow plow for electric railways, Wilder radial *336
Society for the Promotion of Engineering Education, Convention 19
Society of Naval Architects and Marine Engineers, Convention 557
Sounding at great depths 232
Specific gravity and weight of building stone, cements and other non-metallic structural materials. By E. C. Eckel 238
Specifications:
Drawing. Shutting out competition .. 602
Extra work, Clauses relating to 42
German specifications for designing, constructing and testing concrete structures. By L. S. Moisseiff 478
Sprinklers, Automatic, saved theater.603, 697
Stadia rod, Methods of holding. By A. L. Bell *486
Stadia slide rule, Wild's circular. By A. L. Bell *486
Staircase treads, Non-slipping 358
Staybolts, Report on standard specifications 29

*refers to illustrations and † to inserts.

Steam: Method of condensing, by use of water. By C. H. Haswell 552, 553
Steam engineering:
Commercial Economy in Steam and Other Thermal Power Plants. By R. H. Smith.....Eng. Lit. 286
Steam Engineering. By W. W. F. Allen.....Eng. Lit. 286
Steam engines, Compound 148
Steam pipe flanges for marine work. By D. Lovekin 596
Steam shovel operated by wire ropes....*686
Steam turbines:
Advances made 73
Allis-Chalmers, for Brooklyn Rapid Transit Co.....496, *638, 696
Direct current service, Use in 565
Fan blower driven by steam turbine. 491, *493
Hamilton-Holzwarth turbine *495
Marine turbines:
Comparison of, with the reciprocating engine. By J. H. Biles 423
Curtis turbine on the "Salem," "Creole," and "Kaiser" 558
Development and design. By E. M. Speakman *566
Rateau regenerating steam turbine....*151
Review of book by A. Stodola..... Eng. Lit. 51
Warren turbine *494
Steamers:
Bending moments, Longitudinal in Lake steamers. By W. D. Babcock 558
Canadian Pacific Ry., for transatlantic service 386
"Fathomer," for Philippine service. By G. R. Putnam *317
Turbine steamers:
"Carmania" 641
Comparison with steamers having reciprocating engines. By J. H. Biles 423
Curtis turbines on the "Salem," "Creole" and "Kaiser." By C. G. Curtis 558
Development and design of the marine turbine. By E. M. Speakman *566
Stearns, F. P., Biographical sketch of...*263
Steel:
Elastic properties, Effect of combined stress on. By E. L. Hancock *209
Substitution of iron for steel 334
Steel ingots, Use of aluminum to reduce segregation in 443
Stevens, J. F., Biographical sketch of.. *19
Stone:
Specific gravity and weight of building stone. By E. C. Eckel 238
Tensile strength of stone. Tests at Vienna 385
Stone cleaning, New method 361
Stone Cutting Problems. By S. E. Warren .....Eng. Lit. 303
Streams. (See Rivers.)
Street Railway Accountants' Association of America, Convention 356, 359
Street railway track work, Development of special. By Victor Angerer.... 106
Street Railways and Tramways, Permanent Way for. By Thomas Arnall. Eng. Lit. 287
Street repairs, Brooklyn Bureau of, Organization of. By E. J. Fort 318
Streets of Chicago:
Schemes for relieving congested traffic 171
Subsidence of streets due to tunnel construction 47, 207
Stresses in viaduct columns due to braking of trains 335
Structural material, Government investigations of 215
Subways:
Chicago telephone and transportation.. 47, 62, 207, 351, 355
London pipe galleries, Agitation 17
Pipe tunnel at Dover St. Bridge, Boston. By F. I. Winslow 41, *44
(See also Electric railways.)
Superheater on compound consolidation freight locomotive *537
Surveying:
Borehole surveying, Electrical devices for. By H. F. Marriott *91, 97
Establishing the center of a section of land. By W. C. Nespital, W. C. Smiley, F. Hodgman, C. E. Smith, Antonio Llano, H. F. Robinson, F. A. Steiger 254, 311, 381, 463, 518
Mapping the location of buildings on city streets. By T. R. Ansit, C. E. Smith, P. Dodridge, T. B. Shertzer, B. L. Cushing, S. E. Washburn.... *124, *173, 229, *310, *380
Surveying: (Continued.)
Metes and bounds as defined by a Maine deed 334
Problem in surveying *311
River profile work of the U. S. Geological Survey, Kennebec River, Maine. By A. D. Butterfield and G. M. Brett 213
Rod-holding in stadia surveying. By A. L. Bell *486
Triangulation and construction survey for the Simplon Tunnel. By Horace Andrews *662
(See also Railway location.)
Surveyors, Legal responsibility of..... 493, 517, 554
Swimming tank for Chicago Recreation building *164
Switch leads for narrow gage track 602
Switches:
Automatic railway switch invented by Hooper and Wilson 523
Magnetic switch controllers on ore unloaders. By R. I. Wright *481
Safeguarding railway switches 18
Switches, turnouts and switch protection. By E. E. R. Tratman 297
Syracuse, N. Y., Artisan school at..... 668

T.

Technical education of the twentieth century. By J. C. Wait..... 692
Technical literature, British opinion of American. Drawback in foreign technical books.....Eng. Lit. 643
Telephone wires underground 559
Telephones, Public ownership, in Gt. Britain, and the need for public regulation in the U. S. 379
Telescope, Porro prism 104
Testing engineer, The. By C. B. Dudley 67
Testing machines:
Beam testing. By R. A. Cummings...*137
Steel testing. By E. L. Hancock *200
Theaters:
Fire protection of. By J. R. Freeman. *624, 631
Theater saved by automatic sprinklers. 603, 697
Ties:
Care of, A., T. & S. Fe Ry. *5
Concrete. L. S. & M. S. Ry. *175
Piling, for seasoning *87
Piling methods 5
Preservation. (See Timber preservation.)
Reinforced concrete:
Campbell tie *349
Mershon design 497
Percival tie *349
Steel:
Carnegie *202
McCune *349
Timber preservation:
Creosoting works of Western Ry. of France *87
Report at Assoc. Ry. Supts. of Bridges and Buildings 434
Ties, Use and service of treated, A., T. & S. Fe Ry. 5
Timber tests; methods and results 47
Tincauzer, Eugen, Biographical sketch of.*264
Towers:
Steel towers for wood stave water tank, Massena, N. Y. By C. Worthington.*431
Towers for carrying electric power transmission wires at Saramento. By J. D. Galloway 377
Track:
American track from a French point of view 600
Concrete floors. Rails on longitudinal timbers. By J. W. Schaub, J. F. Jackson, J. L. Campbell .*460, 554, 555
Double tracking of railways..205, 276, 524
English street railway construction. By Joseph Owen 250
Permanent track for steam railways. By J. W. Schaub *460
Report at Roadmasters' and Maintenance-of-Way Association 298
Roadbed. Concrete floor and longitudinal timbers *460
Steel longitudinals on the Penn. R. R. *576, 578
Street railway track, Development of special. By Victor Angerer..... 106
Weed killing on roadbeds. By G. H. Herrold, O. P. Shelley 358, 415, 439
Track brake on street railway cars in San Francisco. By F. F. Bodler..*327, *360
Track elevation in Chicago *244, 335
Tracklaying, Fast record of, South Africa 492
Traction engine transportation in Queensland 202
Train bulletin of Chicago & Alton Ry... 23
Trains:
Cost of stopping compared with cost of interlocking plants. By J. A. Peabody 372
Fast runs:
L. S. & M. S. Ry. 10
Penn. Ry. 48
P., Ft. W. & C. 559
Safeguarding railway switches for high-speed trains 18, 41
Traveler on Quebec cantilever bridge erection *274
Trench, Diagram for estimating yardage of 18
Trucks, High-speed, Investigation in Germany 153
Tuberculosis, Dissemination of, as affected by railway travel. By C. B. Dudley 399, 414
Tunneling in soft ground:
Chicago telephone tunnel ..47, 207, 351, 355
Penn. R. R. tunnel at Washington, D. C. 267, 275
Pneumatic process for small tunnels, Dover St., Boston. By F. I. Winslow 41, *44
Tunnels:
Barrientos, Mexico. By C. G. Paterson.*137
Chicago telephone 47, 62, 207, 351, 355
Cincinnati water-works *194
Detroit River 23, 385
East and North River tunnels, New York 315
Electric traction in long tunnels.....669
Hudson River, New York 337, 361, 441
Metropolitan Ry. of Paris. By R. Bonnin *324
Milwaukee water-works 641
Penn. R. R., Washington, D. C..... *267, 275, 335
Reinforced concrete conduit for Salt Lake City *639
Simplon, Triangulation and construction survey for. By Horace Andrews *662
Turbines, Automatic regulations of..... Eng. Lit. 534
(See also Steam turbines.)
Turnouts and crossings, Table for, B. & O. R. R. By J. H. Millburn..... 42
Typhoid fever:
France, Death rate, 1886-1903 62
Outbreaks of, and suggested sanitary precautions 203
Statistics. Some urban and rural aspects 438
Washington, D. C. 153

U.

Union Engineering building, Report of committee on construction 80, *615
Universal dictionary of mechanical drawing. By G. H. Follows *88
University of Michigan 117, 613
University of Wisconsin 248, 582
Unloading machine, Ore, for use at receiving docks *125
Upsetting machine for eye-bars, Keystone Bridge Works, 1882. By J. H. Springer $175

V.

Valves, Water pressure regulating.....*688
Ventilating fans and pipes, Experiments with. By D. W. Taylor 557
Viaducts:
Cannington. By Arthur Wood-Hill and E. D. Pain, Emile Low, F. F. Weldt *452, 554, 602
Norfolk & Western Ry *441
Reinforced concrete, Key West Extension *407
Vicat needle apparatus for cement-testing laboratories, Improved form ..*174
Vitrified tile sewers as house drains in Chicago. By P. L. Hedrick *458

W.

Wage rates and the cost of living in the U. S. 333
Wallace, John F. 17, 20
Warships:
Comparison of ships of different nations 558
Design of cruisers 558
"Mississippi," Dimensions 315
New vessels 316
Washington Barracks, Engineer school at 559
Waste of construction material in engineering work 491
Water-hoist, Automatic electric, at mine of D., L. & W. R. R. *582
Water meters on private fire services .. 312
Water pipe:
Concrete, Making, for high water pressures. By C. R. Steiner 438
Cost of laying, Atlantic City, N. J. By Kenneth Allen 274
Fort Meade, S. D. *681
Riveting hydraulic pipe line, in mining practice. By R. L. Grider *78
Steel:
Brigham City, Utah. By W. P. Hardesty *236
Sydney, N. S. W. 126
Strength of pipe. Calculating thickness 311
Wood:
Brigham City, Utah. By W. P. Hardesty *235
Machine banded pipe, Arizona 48
Old pipe, 1887, Quincy, Ill. By Edward Prince *406
Water pollution in New York Bay 202
Water purification:
Columbus, Ohio. By Julian Griggs .. 313
Copper sulphate treatment:
Ancient practice in the Far East 231
Denver, Colo., Tabulated results. By G. T. Prince *575, 603
Experiments by D. D. Jackson 307
Symposium, N. E. Water-Works Assoc. 306, 461, 473
Danville, Va. Contract tests of filters. 337
Philadelphia. Report of Board of Investigating Engineers. Case of J. W. Hill 103, 461, 466, 493
Sand filters, Employment of restraining culture media in testing the hygienic efficiency of. By A. Robin 160
Springfield, Mass., Filtration plant recommended 584
Water rates, Reports on, N. E. W.-W. Assoc. and Am. W.-W. Assoc..305, 675
Water softening:
Columbus, Ohio. By Julian Griggs 314
Locomotive boilers, experience of railways. By T. W. Snow 510
Oberlin, Ohio *313
Water supply:
Chicago 169, 699
Divining rod, Use of, in Germany 386
Hot spring, Supply from, New Mexico. 614
New York State Water Supply Commission 414, 419
Tastes and odors in river water 116, 121
Underground, Location of. By M. L. Fuller 517
Water tanks:
Concrete bottom and wooden sides, Massena, N. Y. By C. Worthington *431
Protecting railway tanks from freezing.*456
Wood stave tank with concrete platform on steel tower. By C. Worthington *431
Water waste prevention 312
Water wheels:
Doble wheel. By J. D. Galloway *134
Hints to users 215
Wheel cut from solid block of pine.... 671
Water-works:
Cincinnati, Ohio *194
Fire insurance policies as an incentive to improvements 379
Los Angeles, Cal., Projects 146, 147, 314
Manila, P. I., Bids asked 337
Private and municipal ownership 311
Water-works appraisals:
Principles governing. By A. L. Adams 197, 203
Relation of water supply to typhoid fever epedemics 147
Weed killing on railway roadbeds. By G. H. Herrold, O. P. Shelley..358, 415, 439
Weir, Submerged. Overturning concrete tower *372, *523
Welcher, J. W., Biographical sketch of.*264
Wheelbarrow, Cubical capacity of. By F. H. Lewis, C. H. Miller, J. H. Harlow 205, 253, 310
Wind gage on the Leven viaduct 579
Winds at Manila 540
Wireless telegraphy:
Chicago & Alton Ry. 47
Wireless Telegraphy. By A. F. Collins. Eng. Lit. 291
Wires overhead, Dangers from 251
Wood, Ancient, found in New York City.*535
Worcester Polytechnic 582

Y.

Yellow fever:
Helena, Ark. By F. H. Wright..224, 227
New Orleans. By Ronald Ross..... 135, 147, 153, 177, 206, 233, 253, 420

AUTHOR INDEX.

Andrews, Horace, 662; Andrews, Thomas, 435; Adams, A. L., 197; Adams, J. D., 64; Aiken, W. A., 63, 149; Allen, Kenneth, 274; Angerer, Victor, 106; Ansit, T. R., 124; Ashe, S. W., 34; Atkinson, Edward, 196.

Bainbridge, F. H., 323; Banks, E. J., 254; Barker, L. H., 99; Barlow, J. R., 335; Barrow, A. C., 602; Bastow, A. H., 205; Beardsley, J. W., 538; Bell, A. L., 486; Bellet, Daniel, 419; Bengler, C. E., 517; Biles, J. H., 423; Bishop, W. I., 205; Boardman, H. P., 166, 523; Bodler, F. F., 327; Bogert, C. L., 357; Bonnin, R., 324, 604; Booth, W. M., 102; Bouillon, A. V., 439; Brooks, J. P., 633; Buchanan, C. P., 464; Buck, R. S., 674; Burnham, R., 660; Butcher, W. L., 634; Butterfield, A. D., 213; Butterworth, Irvin, 163.

Campbell, J. L., 555; Carter, E. C., 544; Case, J. F., 411; Chausee, Alcide, 296; Cochran, A. W., 612; Corner, C., 492; Cox, L. M., 586; Crockett, C. W., 654; Cudworth, F. G., 400; Cummings, R. A., 137, 212, 225; Cunningham, A. C., 585; Cunningham, Wayne, 18; Cushing, B. L., 174.

Dabney, T. G.; Darlington, E. B., 129; De Knight, E. W., 335; Doddridge, P., 310; Douglas, W. J., 155; Dudley, C. B., 67, 399; Dull, R. W., 149; Dunham, H. F., 43; Dyer, John, Jr., 334.

Eby, J. H., 172; Eckel, E. C., 238, 613; Enright, Bernard, 124.

Fielding, J. S., 522; Follows, G. H., 88, 151, 256; Fort, E. J., 318; Freeman, J. R., 624; Frickstad, W. N., 633; Fuller, A. H., 46, 57; Fuller, M. L., 517.

Gabelman, Fred, 59; Galloway, J. D., 131, 377; Garman, H. O., 109; Gay, R. W., 517; Gillette, C. E., 81; Gillette, H. P., 298; Godfrey, Edward, 330, 671; Gordon, C., 137; Graham, G. S., 493; Grider, R. L., 78.

Haggart, C. N., 124; Hanna, F. W., 118; Hagloch, F. W., 231; Hall, W. H., 589, 617; Hancock, E. L., 209; Hardesty, W. P., 235; Harlow, J. H., 74, 310; Hartranft, W. G., 206; Havens, V. L., 150; Hayford, J. F., 33; Hays, J. W., 151, 671; Hazlehurst, G. B., 357; Hazlehurst, J. N., 294; Hedrick, P. L., 459; Heidenreich, E. L., 383; Henning, G. C., 381, 415, 517, 633, 671; Hepburn, C. G., 201; Herrold, G. H., 415; Herschel, Clemens, 247; Herschmann, A. J., 635; Hill, A. B., 411, 603; Himes, A. J., 416; Hoad, W. C., 140; Hobby, A. S., 18; Hodgman, F., 311, 579; Hoffman, J. D., 75; Hogan, J. M., 158; How, R. W., 415; Howard, C. P., 695; Howard, E. E., 695; Howell, J. W., 45; Humphrey, R. L., 300; Hunter, W. E., 89; Hurlbert, C. C., 415; Hyde, W. H., 295.

Jackson, D. D., 307; Jackson, J. F., 555; Jeffrey, G. W., 380; Jinear, E. N., 380; Johnson, L. J., 602; Jordahl, A., 517; Jutton, Lee, 564.

Kellogg, E. F., 555; Kent, William, 416; Kern, W. E., 517; Ketchum, M. S., 551; Keyser, F. W., 383; Kimball, W. H., 633; Kinealy, J. H., 242.

Latham, Baldwin, 666; Lea, S. H., 680; Lesley, R. W., 523; Lewis, C. T., 75; Lewis, F. H., 125, 206, 253; Llano, Antonio, 382; Lovekin, L. D., 596; Low, Emile, 554; Lupfer, S. L., 278.

MacCart, W. A., 583; McCaustland, E. J., 598; McCullen, J. T., 493; Macdonald, J. A., 633; Marks, W. D., 68, 448; Marriott, H. F., 91; Mason, G. C., 206; Mason, W. P., 352; Mathot, R. E., 216; Mercer, H. C., 687; Milburn, J. H., 42; Miller, C. H., 253; Moisseiff, L. S., 479; Moyer, Albert, 690; Murphy, E. C., 9; Musson, E. F.; Myers, J. S., 89.

Neely, S. T., 229; Nespital, W. C., 311.

Odlum, E. J., 205; Okma, K., 335; Owen, Joseph, 250.

Pain, E. D., 452; Palmer, H. S., 603; Palmer, N. F., 44; Patterson, H. S., 357; Payne, H. M., 633; Pierce, W. S., 265; Porter, H. F. J., 638, 665; Prince, E., 16, 145, 466; Prince, G. T., 575; Putnam, G. R., Jr., 317; Puzey, Edwin, 603.

Quick, C. D., 687.

Raymond, C. A., 94; Reeve, S. A., 464; Rice, H. H., 341; Ripley, T. M., 603; Roberts, T. P., 138; Robin, A., 160; Robinson, H. F., 382; Ross, Ronald, 135.

Sargent, C. E., 633; Schaub, J. W., 460; See, Horace, 471; Sewell, J. S., 439; Shelley, O. P., 439; Shertzer, T. B., 173; Shonts, T. P., 512; Smith, C. E., 173, 381, 519; Snow, G. H., 74; Snow, T. W., 510; Soper, E. C., 664; Sprague, F. J., 672; Springer, J. H., 175; Springer, J. H., Sr., 465; Starr, J. E., 640; Steiger, F. A., 519; Steiner, C. R. 254, 438; Steinmetz, C. P., 7; Stevens, H. L., 509; Stewart, W. G., 308; Strauss, J. B., 293; Strobel, C. L., 579; Swain, C. L., 150.

Taylor, W. D., 174; Thompson, R. S., 31; Thullen, L. H., 32; Thurnwerth, E. K., 346; Torrance, W. M., 304, 438; Trautwine, J. C., Jr., 621; Tripp, O. H., 334; Turner, C. A. P., 384.

Urquhart, W. W., 438.

Van Brunt, John, 381.

Waddell, J. A. L., 607; Wait, J. C., 692; Waite, H. M., 322; Walker, G. S., 100; Wallace, S. A., 579; Washburn, S. E., 381; Watson, Walter, 492; Weber, Carl, 205; Weeks, W. C., 439; Weld, F. F., 602; Wemlinger, J. R., 606; Wheat, J. H., 633; Wheeler, E. T., 141; White, L., 90; White, T. F., 314; Winslow, F. I., 44; Wightman, L. I., 587; Wisner, G. Y., 141; Wood, C. L., 695; Wood-Hill, Arthur, 452; Woolson, I. H., 35, 459; Worley, J. S., 38; Worthington, Chas., 149, 431, 521; Wright, F. H., 224; Wright, R. L., 481.

Young, C. E., 518.

*refers to illustrations and † to insets.

ENGINEERING LITERATURE (SUPPLEMENT).

EDITORIALS.

B.

Book-bindings, Most durable material for 49
Book-making, Author's part in the technic of 49

C.

Cement, Standard methods for testing and standard specifications for 387

E.

Efficiency, Use of word 179
Engineering News:
Files in various cities 643
Index, New consolidated 643
Engineer's need of reading knowledge of French and German 179

H.

Hydrology, Notes on 387

M.

Municipal Library at Frankfort, Germany, American Section in 179

R.

Reinforced concrete, Nomenclature of .. 49
Reports of public engineering department, Scope of 387
Richardson's modern asphalt pavement. 50

T.

Technical books, Drawbacks in 643

TITLES.

A.

Advanced Mechanical Drawing..... 530
American Railway Engineering and Maintenance of Way Association .. 532
American Street Railway Investments.. 50
American Telephone Practice..... 52
American Tool Making and Interchangeable Manufacturing 52
Augenblicklicher Stand der Abwasserreinigung Nach Dem Sogenannten Biologischen Verfahren 185
Automatische Regulierung der Turbinen 534

B.

Bacteriological Report of Municipal Mechanical Filtration Plant at Danville, Virginia 394
Bacteriology and the Public Health 53
Ballasted Bridge Floors 56
Berlin-Zossen Electric Railway tests 183
Bridge and Structural Design 646
British Standard Rail Sections and Specifications 56

C.

Cements, Limes and Plasters 394
Census Bureau 289
Central Electric Light and Power Stations 531
City, The 648
Civil Engineering 285
Classified Guide to Technical and Commercial Books 395
Coast Erosion 54
Coke and Coke Ovens 182
Commercial Economy in Steam and Other Thermal Power Plants 286
Comparative Statistics, Cities of Ohio . 533
Concrete-Steel 291
Connecticut Highway Commissioner 186
Contribution l'Etude de la Fragilite dans des Fers et les Aciers 284
Copper Handbook 284
Crystallization of Iron and Steel 528

D.

Dampfturbinen, Die 51
Der Eisenban 184
Der Eisen-Beton und Seine Anwendung im Bauwesen 646
Design and Construction of Metallic Bridges 531
Design of Concrete-Steel Beams 56
Disposal of Household Wastes at Summer Resorts 183

E.

Earthwork Tables 650
Economical Steam Rolling of Irish Country Roads 54
Electricians' Handy Book 290
Elements of Geodetic Astronomy 289
Elements of the Mathematical Theory of Electricity and Magnetism 200
Energie Hydraulique et les Recepteurs Hydrauliques 182
Engineering Chemistry 532
Entwerfen und Berechnen der Dampfmaschinen 181
Entwerfen und Berechnen der Verbrennungsmotoren 181
Exporters' Encyclopaedia 644

F.

Fans 179
Filtration of Public Water Supplies 53
Finances of Gas and Electric Light and Power Enterprises 54
Forestry Bureau, Department of Agriculture 290
Forestry Bureau of the Philippine Islands 56

G.

German Technical Words and Phrases. 286
Glasgow Municipal Enterprises 54
Gold and Tin Dredging Practice 186
Gold Dredging 186
Gold Dredging in California 186
Government Regulation of Railway Rates 533

H.

Handbook of Cost Data for Contractors and Engineers 527
Handbook of Metallurgy 643
Handbook of Timber Preservation 645
High Tension Power Transmission 530
Hydraulic Diagrams 530
Hydraulic Power Engineering 182
Hydraulic Tables 283
Hydrology of the State of New York .. 391

I.

Illustrated Carpenter and Builder 396
Immunity in Infective Diseases 646
Improvement, Repair and Maintenance of Public Highways 290
Industrial Problem 52
Irrigation in the Western U. S. 392

L.

Law Relating to Oil and Gas 54
Lehrbuch der Baumaterialienkunde 185
Lehrbuch der Mechanisch-Metallurgischen Technologie 529
Lives of the Engineers 395, 643

M.

Machine Design 650
Machine-Shops, Tools and Methods 529
Machine Tools and Workshop Practice .. 52
Manual of Practical Hygiene 289
Mechanical Drawing 284
Mechanics of Air Machinery 52
Mechanics of Materials 389
Methods and Costs of Gravel and Placer Mining in Alaska 186
Mining and Quarry Industry of New York State 290
Modern Locomotive Engineering 645
Modern Refrigerating Machinery 292
Moody's Manual 52
Municipal Ownership of Street Railways 56

N.

National Municipal League 531
Neuere Turbinenanlagen 181
Neueste Entwicklung der Wasserhaltung 185
New York Bay Pollution Commission .. 534
New York State Annual Report 646
Nickel Steel 183
Notes on British Refuse Destructors 54
Notes on Mechanical Drawing 646

P.

Panama Canal Project 289
Permanent Way for Tramways and Street Railways 287
Physikalisch-Chemische Betrachtugen Uber Den Verbrennungs-Prozess in Den Gasmotoren 394
Pocket-book of Mechanical Engineering. 649
Poor's Directory of Railway Officials .. 644
Poor's Manual of Railroads of the United States 644
Practical Alternating Currents and Alternating Current Testing 285
Practical Planer Kinks 531
Problems in Stone Cutting 393
Protecting and Waterproofing Solid Bridge Floors 56

R.

Railway Equipment and Traffic 395
Railways of Cape Colony 56
Red Gum 395
Redes Electricas 395
Restrictive Railway Legislation 533
Return System of Compressed Air Power Transmission 645
Road Builders 534

S.

Sanitation of a Country House 183
Second Year Chemistry 532
Sewage Disposal 532
Sewage Disposal Plants in Ohio, Wisconsin and Illinois 533
Sewerage and Sewage Purification 532
Slices From a Long Loaf 644
Soils and Fertilizers 284
South African Architect and Builder ... 396
Standard Methods of Testing and Specifications for Cement 390
Standard Lime, Status of the Use of 53
State Board of Health of Massachusetts 533
State Supervision and State Aid 644
Statically-Indeterminate Stresses in Frames Commonly Used for Bridges 530
Steam Engineering 284
Steam Power Plant 644
Strengths of Beams, Floors and Roofs.. 284
Structural and Field Geology 532
Studie uber die Bestimmung der Normalprofile Geschiebefuehrender Gewasser 183
Suspended Matter in Sewage and Effluents 532
Synchronous and Other Multiple Telegraphs 532

T.

Tables and Other Data for Engineers and Business Men 53
Tanking of Sewage 532
Technische Messungen 53
Tensile Strength of Copper-Tin Alloys. 532
Theorie Der Zentrifugalpumpen 648
Tools for Engineers and Woodworkers.. 52
Traeger-Sabelle 183
Traite Complet de la Fabrication des Bieres 53
Typhoid Fever Epidemic at Palo Alto, California 394

U.

U. S. Geological Survey 55, 181, 289, 396, 528, 534, 644

W.

Waddell, J. A. L., Papers of 50
Water Analysis, Standard Methods of ... 53
Water Supply and Irrigation Papers, U. S. Geological Survey....55, 289, 396, 534
Winter Visit to Some Sewage Disposal Plants in Ohio, Wisconsin and Illinois 532
Wireless Telegraphy 291

Y.

Year Book of Legislation 652

Z.

Zwangiaeufige Regelung der Verbrennung bei Verbrennungsmaschinen . 181

CONSTRUCTION NEWS (SUPPLEMENT).—CONTRACT PRICES.

Asphalt paving; see Paving Asphalt.

Backfilling, San Francisco, Cal. 73
Ballast rock, Duluth, Minn. 16
Basinheads, reset, Bayonne, N. J. 196
*Belle Fourche Dam, Belle Fourche, S. Dak. 153
*Big Cottonwood conduit, Salt Lake City, Utah 90
*Billings Irrigation Canal, Billings, Mont. 224
*Block paving, Centralia, Ill. 161
Blow offs, New York, N. Y., 31, 90, 170; Portland, Ore., 143, 206; Toledo, O., 99, 169.
Blow offs, to set, New York, N. Y.. 216
Boilers, Toledo, O. 6
Bolts, carriage, Grand Rapids, Mich... 143
Bolts, drift, Grand Rapids, Mich., 90, 126, 143; New York, N. Y., 143.
Bolt holes, Nashville, Tenn. 89
Bolts, screw, Grand Rapids, Mich.90, 126, 143
Bolts, track, Washington, D. C. 117
Boulders, removing, Boston, Mass., 15; Portland, Me., 15.
Boxing for pipe, New York, N. Y. 224
Boxing, pipe, New York, N. Y. ..31, 143, 206
Braces, rail, Washington, D. C..... 117
Branches; see Sewer Pipe Specials and Water Pipe Specials.
Brick, building, Washington, D. C. 143
*Brick Paving, Centreville, Ia. 49
*Bridge Abutments, Point St. Bridge, Providence, R. I. 40
Bridges, Billings, Mont. 224
Bridge stone, taken up and stored, Bayonne, N. J. 196
Broken stone, Columbus, O., 57, 195; Havre, Mont., 40.
Bronze, New York, N. Y., 57; Pittsburg, Pa., 49.
Bulkhead, Philadelphia, Pa. 31

Cables, New York, N. Y. 57
Carbon steel, New York, N. Y. 57
Cast iron, Brooklyn, N. Y., 170, 180; Pittsburg, Pa., 49; Portland, Ore., 57.
Castings, iron, Columbus, O. 195
Castings, place, Cincinnati, O..... 126
Castings, iron, furnish and place, Cincinnati, O. 126
Castings, special, Columbus, O., 195; East Syracuse, N. Y., 15; New York, N. Y., 216; New York, N. Y., 224.
Castings, special, in place, Havre, Mont. 40
Catch basins, Clinton, Ia., 81, 179; New York, N. Y., 152; Parkersburg, W. Va., 144; Portsmouth, O., 16; Seattle, Wash., 31, 73, 108; Summit, N. J., 31; Williamsport, Pa., 144.
Catch basin connections, Clinton, Ia...81, 179
Catch basins, removed, Seattle, Wash.. 108
Cement, asphaltic, Portland, Ore..... 57
Cement, hauling, Denver, Colo..... 65
Cement platforms, Brooklyn, N. Y..... 170
Cement, Portland, Billings, Mont., 128; Cincinnati, O., 16; Denver, Colo., 161; Los Angeles, Cal., 126; Louisville, Ky., 31; New York, N. Y., 143; Washington, D. C., 99; Wheeling, W. Va., 15.
Cheeks, stone, New York, N. Y. 152
Clearing and grubbing, Los Angeles, Cal., 73; Portland, Ore., 143, 206; Seattle, Wash., 108.
*Cobbs Hill Reservoir, Rochester, N. Y. 40
*Colbert Schools Canal, Chattanooga, Tenn. 99
Collectors, sewer, Columbus, O. 195
Columns, steel, Brooklyn, N. Y. 170
Compacting fills, Cincinnati, O. 126
Concrete, Billings, Mont., 15, 89; Brooklyn, N. Y., 170; Chattanooga, Tenn., 171, 179; Chicago, Ill., 224; Cincinnati, O., 126; Columbus, O., 57, 195; Danbury, Conn., 117; Denver, Colo., 65, 171; East Syracuse, N. Y., 15; Elyria, O., 196; Lebanon, Pa., 196; Lexington, Ky., 117; Montrose, Colo., 82, 117; Mount Vernon, Ill., 65; Nashville, Tenn., 89; Newton, N. J., 90; New York, N. Y., 57, 117, 143; Portland, Ore., 57, 143; Providence, R. I., 40; Salt Lake City, Utah, 90, 126; Seattle, Wash., 73; St. Joseph, Mo., 99; Summit, N. J., 31; Toledo, O., 99, 169; Washington, D. C., 73, 108; Williamsport, Pa., 144.
Concrete, cinder, Brooklyn, N. Y..... 170
*Concrete conduit, Richmond, Va., 99, 153; Toledo, O., 169.
Concrete cradle, Brooklyn, N. Y. 179
Concrete foundations, Brooklyn, N. Y., 170; Hartford, Conn., 108; Portland, Ore., 206; Richmond, Va., 99, 153.
Concrete, furnish and place, San Francisco, Cal. 73
Concrete in place, Havre, Mont. 40
Concrete, reinforced, Brooklyn, N. Y., 170; Portland, Ore., 57; Richmond, Va., 153.
Concrete, etc., removal, Washington, D. C. 108
*Concrete sewers, Washington, D. C. 40
Conduits, vitrified clay, Brooklyn, N. Y. 170
Coping, Boston, Mass., 57; Brooklyn, N. Y., 180; Hartford, Conn., 108.
*Corbett Tunnel, Billings, Mont. 89
Corporation cocks; see Water pipe specials.
Crossings, alley, concrete, Seattle, Wash. 73
Crosswalks, timber, Seattle, Wash....73, 108
Curb, Belleville, Ill., 16; New York, N. Y., 143; Portsmouth, O., 16; Seattle, Wash., 31;
Curb, cement, Centreville, Ia..... 49
Curb, concrete, Bayonne, N. J., 196; Brooklyn, N. Y., 170; Kirksville, Mo., 179; Sterling, Ill., 108.
Curb and gutter, concrete, Bayonne, N. J., 196; Champaign, Ill., 108; Huntington, W. Va., 179.
Curb and gutter, New York, N. Y...31, 170
Curb and gutter, reset, New York, N. Y. 31, 80, 90
Curb, gutter, New York, N. Y. 216
Curb corners, Bayonne, N. J. 196
Curb, reset, Altoona, Pa., 169; Bayonne, N. J., 196; Champaign, Ill., 108.
Curb, stone, Altoona, Pa., 169; Auburn, N. Y., 57; Bayonne, N. J., 196; Centralia, Ill., 161; Champaign, Ill., 108; Jersey Shore, Pa., 49; New York, N. Y., 152, 187; Sherman, Tex., 153.
Curb, stone, redressed and reset, New York, N. Y. 117
Curb, stone, reset, Brooklyn, N. Y., 170; Jersey Shore, Pa., 49.

*Dalles-Celilo Canal, Portland, Ore. 57
Dam, coffer, Chicago, Ill. 224
Ditches, waste water, Billings, Mont... 224
Ditching, Billings, Mont. 224
Dock, piles, etc., Chicago, Ill. 224
Drains, Freehold, N. J. 31
Drain pipe, Boston, Mass., 57; Clinton, Ia., 81, 179; Clinton, Ia., 179; Lexington, Ky., 117; New York, N. Y., 31, 152, 170; Portland, Ore., 57.
Drain pipe, vitrified; New York, N. Y... 216
Dredging; see Earth excavation and Rock excavation.

Earth excavation, Belle Fourche, S. Dak., 153; Billings, Mont., 15, 89, 224; Brooklyn, N. Y., 170; Chattanooga, Tenn., 99, 179; Cincinnati, O., 126, Columbus, O., 195; Denver, Colo. 160, 171; East Syracuse, N. Y., 15; Glendive, Mont., 195; Los Angeles, Cal., 73; Miami, Fla., 90; Montrose, Colo., 82; Nashville, Tenn., 89; New York, N. Y., 216; Portland, Ore., 57; Rochester, N. Y., 49; Salt Lake City, Utah, 90; San Francisco, Cal., 73.
Earth excavation and backfill, Dayton, O., 40; Portland, Ore., 143.

*refers to title of work.

Earth excavation, dredge, Baltimore, Md., 31; Boston, Mass., 15, 57, 72; Brooklyn, N. Y., 180; Charleston, S. C., 100; Chicago, Ill., 40; Duluth, Minn., 15; Grand Rapids, Mich., 126, 143; Mobile, Ala., 31, 100; New London, Conn., 73; New Orleans, La., 206; New York, N. Y., 90, 99, 100, 126, 143, 187, 194; Norfolk, Va., 31, 65; Philadelphia, Pa., 31; Portland, Me., 153, 196; Portland, Me., 15; San Francisco, Cal., 73; Washington, D. C., 153; Wilmington, Del., 65.

Earth excavation and refill, Havre, Mont., 40; Richmond, Va., 153.

Earth excavation from borrow pits, Belle Fourche, S. Dak., 153.

Earth excavation, sand, Portland, Ore... 57

Earth excavation, wet, Billings, Mont... 15

Earth excavation, overhaul, Belle Fourche, S. Dak., 153; Billings, 15; Denver, Colo., 160, 171; Glendive, Mont., 195; Los Angeles, Cal., 73; Montrose, Colo., 82.

Earth excavation, grading, Belle Fourche, S. Dak., 153; Boston, Mass., 57; New York, N. Y., 152; Quincy, Mass., 73; Seattle, Wash., 48.

Earth excavation, street, Auburn, N. Y., 57; Bayonne, N. J., 196; Centralia, Ill., 161; Centreville, Ia., 49; Champaign, Ill., 108; Freehold, N. J., 31; Portsmouth, O., 16; Seattle, Wash., 31, 73, 108; South Bend, Ind., 126.

Earth excavation, stripping, Belle Fourche, S. Dak. 135

Earth excavation, trench, Chattanooga, Tenn., 171; Columbus, O., 57; East Syracuse, N. Y., 15; Elyria, O., 196; Havre, Mont., 40; Lexington, Ky., 117; Lebanon, Pa., 196; New York, N. Y., 31, 89, 90, 143, 170; Ogden, Utah, 40; Parkersburg, W. Va., 144; Salt Lake City, Utah, 126; Summit, N. J., 31; Washington, D. C., 40; Williamsport, Pa., 144.

Earth excavation, trench and backfill, New York, N. Y., 187; Portland, Ore., 206.

Earth excavation, tunnel, Chattanooga, Tenn. 171

Edgestone, Boston, Mass., 57; New York, N. Y., 152.

Embankment, Billings, Mont., 89; Centralia, Ill., 161; Danbury, Conn., 117; Mount Vernon, Ill., 65; Nashville, Tenn., 89; San Francisco, Cal., 73.

Embankment filling, Billings, Mont., 89; Duluth, Minn., 15; Grand Rapids, Mich., 143; Lexington, Ky., 117; Nashville, Tenn., 89; New York, N. Y., 31, 90, 143, 170, 216; Quincy, Mass., 73; Salt Lake City, Utah, 126; New York, N. Y., 89; Winnetka, Ill., 65.

Embankment, levee, Greenville, Miss., 31; New Orleans, La., 72.

Embankment, rolled, Columbus, O., 195; Rochester, N. Y., 49.

Engines, Gas, Toledo, O. 6

Excavation, masonry, New York, N. Y., 31, 143, 170, 187

Excavation, masonry, without blasting, New York, N. Y. 89, 90, 206

Excavation, rock and earth, Billings, Mont., 89; Brooklyn, N. Y., 180; Denver, Colo., 65; Newport, R. I., Providence, R. I., 40; Richmond, Va., 99; Washington, D. C., 108; Williamsburg, Pa., 143.

Excavation tunnel, mortar face lining, Toledo, O. 99, 169

Excavation, tunnel, open cut, mortar face lining, Toledo, O. 99, 169

Excavation tunnel, open cut, tile lining, Toledo, O. 99, 169

Excavation, tunnel, tile lining, Toledo, O. 99, 169

Excavation tunnel, Billings, Mont., 15, 89; Brooklyn, N. Y., 180; Montrose, Colo., 82, 117.

Excavation, tunnel, earth, Salt Lake City, Utah 90

Excavation tunnel, rock, Salt Lake City, Utah 90

Eyebars, New York, N. Y. 57

Fence, pipe, New York, N. Y. 152

Filling; see Embankment.

Filling and Embankment, New York, N. Y. 206

Fill, borrowed, New York, N. Y. 152

Filling, sand, about heads of piles, Washington, D. C. 108

*Filtered Water Conduit, Toledo, O..... 99

*Filtration Plant, Cincinnati, O. 126

Flange unions; see Water pipe specials.

Flashboards, Billings, Mont. 15, 224

Floor, concrete, Chicago, Ill. 224

Flush line, Boise City, Idaho 179

Flush tanks, Ames, Ia., 90; Dayton, O., 40; Lexington, Ky., 117; Newton, N. J., 90; New York, N. Y., 31; Watertown, Wis., 100.

Flush tank connections, Dayton, O. 40

Frogs, rail, Washington, D. C. 117

Gates, head, Boise City, Idaho 179

Gates and guides, Billings, Mont. 15

Gates, setting, Billings, Mont. 15, 224

Gates, sluice, Columbus, O. 195

Gates, wooden, Billings, Mont. 224

Gravel, coarse, Billings, Mont. 224

Girders, lattice, Denver, Colo. 171

*Gowanns Flushing Tunnel, Brooklyn, N. Y. 180

*Grade Crossing Abolishment, Brooklyn, N. Y. 170

Grading; see Earth excavation and Rock excavation.

Gravel, Belle Fourche, S. Dak., 153; Billings, Mont., 15; Columbus, O., 195; Denver, Colo., 171; Sherman, Tex., 153.

Gravel, filter, placing, Cincinnati, O. 126

Gravel foundation, street, Seattle, Wash. 31

Gravel, screened, Belle Fourche, S. Dak. 153

Grout, Salt Lake City, Utah. 90

*Gunnison Tunnel, Montrose, Colo 117

Gutter, brick, Seattle, Wash. 31

Gutter, paved, Columbus, O. 195

Headers, Centralia, Ill., 161; Sherman, Tex., 153.

Hearting, oyster shell, Washington, D. C. 161

*High Pressure Mains, New York, N. Y. 187

Hydrants, Ashland, Pa., 65; Lebanon, Pa., 196; Libertyville, Ill., 126; New York, N. Y., 31, 89, 90, 143, 170, 187, 206; Seattle, Wash., 31; Union, N. J., 65.

Hydrant connections, in place, Havre, Mont. 40

Hydrants, double-nozzle—New York, N. Y. 216, 224

Hydrants, set, Ames, Ia., 100; Havre, Mont., 40; Union, N. J., 65.

*Hydraulic apparatus, Los Angeles, Cal. 195

I beams, see Steel.

Inlets, sewer, Williamsport, Pa..... 144

Inspection, New York, N. Y..... 57

*Intercepting sewer, Salt Lake City, Utah 126

*Interstate Canal, Denver, Colo..... 169

Iron, Columbus, O., 57; Rochester, N. Y., 49; Seattle, Wash., 48.

Iron and steel, New York, N. Y..... 170

Iron and steel, setting, Salt Lake City, Utah 90, 126

Iron castings, New York, N. Y..... 57

Iron, gates, guides, etc, Belle Fourche, S. Dak. 153

*Irrigation Canal, Huntley Project, Billings, Mont. 15

*Irrigation canals, Glendive, Mont..... 195

Jetty Work, Newport, R. I. 100

Kahn bars, Denver, Colo. 171

Lampholes, Ames, Ia., 90; Dayton, O., 40; Gettysburg, Pa., 31.

Lead, New York, N. Y. 57

Lead Fillers, New York, N. Y. 57

Lifting devices, setting, Billings, Mont. 224

Lifting device, Ratchet, Billings, Mont. 224

Loam, Columbus, O. 195

*Lock and Dam No. 21, Nashville, Tenn. 89

Lumber, Billings, Mont., 224; Dayton, O., 40; Denver, Colo., 171; Elyria, O., 196; Havre, Mont., 40; Lexington, Ky., 117; Newton, N. J., 90; New York, N. Y., 143, 187; Parkersburg W. Va., 144; Salt Lake City, Utah, 120; Seattle, Wash., 48; Williamsport, Pa., 144.

Lumber, preserving—Billings, Mont..... 224

Macadam, Brooklyn, N. Y., 170; Freehold, N. J., 31; Lexington, Ky., 117; New York, N. Y., 31, 143, 170, 206, 224.

Macadam, relay and restore, New York, N. Y. 90

Macadam, Telford pavement—New York, N. Y. 216

*Main Sewers, Lexington, Ky..... 117

Manholes, Ames, Ia., 90; Boise City, Idaho, 179; Brooklyn, N. Y., 179, 180; Cape May, N. J., 144; Chattanooga, Tenn., 171; Clinton, Ia., 81, 179; Dayton, O., 40; East Syracuse, N. Y., 15; Gettysburg, Pa., 31; Janesville, Wis., 6; Lexington, Ky., 117; Newton, N. J., 90; New York, N. Y., 152; Portland, Ore., 143; Portsmouth, O., 16; Seattle, Wash., 31, 48, 73; St. Joseph, Mo., 99; Summit, N. J., 31; Toledo, O., 99, 169; Watertown, Wis., 100; Williamsport, Pa., 144; Winnetka, Ill., 65.

Manholes and Flush tanks, Combined, Ames, Ia. 90

Manhole, brick, Ogden, Utah..... 40

Manhole covers, New York, N. Y..... 117

Manholes, Junction, Cape May, N. J., 144; Chattanooga, Tenn., 171; Summit, N. J., 31.

Manholes, reconstruction, Seattle, Wash. 48

Manholes, removed, Seattle, Wash..... 31

Manure, New York, N. Y. 152

Masonry, Denver, Colo., 65; New York, N. Y., 170; Parkersburg, W. Va., 144; Providence, R. I., 40; Williamsburg, Pa., 143.

Masonry, brick, Boston, Mass., 57; Brooklyn, N. Y., 170, 180; Columbus, O., 57, 195; Elyria, O., 196; New York, N. Y., 31, 89, 143, 170, 187, 206, 216, 224; Parkersburg, W. Va., 144; Salt Lake City, Utah, 90, 126; Washington, D. C., 40; Williamsport, Pa., 144.

Masonry, Concrete, Belle Fourche, S. Dak., 153; Boston, Mass., 57; Brooklyn, N. Y., 180; New York, N. Y., 31, 89, 90, 170, 187, 206, 216, 224; Rochester, N. Y., 49; Seattle, Wash., 48.

Masonry, dry stone, New York, N. Y..... 216

Masonry excavation, without blasting, New York, N. Y. 216

Masonry, rubble, Billings, Mont., 15; Hartford, Conn., 108; Portland, Ore., 57; Montrose, Colo., 82; New York, N. Y., 143, 152, 170, 187, 216.

Masonry, stone, Boston, Mass., 57; New York, N. Y., 170; Providence, R. I., 40.

*Metal Work, Manhattan Bridge, New York, N. Y. 57

Meter, Venturi, Columbus, O 195

Mould, New York, N. Y. 152

Nickel steel, New York, N. Y. 57

Nozzles, sprinkler, Columbus, O..... 195

Oiling streets, San Francisco, Cal..... 57

*Pathfinder Dam, Denver, Colo..... 65

Paving, asphalt, Bayonne, N. J., 196; Brooklyn, N. Y., 170; Columbus, Ind., 31; New York, N. Y., 31, 143, 170, 187, 206, 216, 224; Seattle, Wash., 31.

Paving, asphalt, relay, Dayton, O., 40; New York, N. Y., 89, 90.

Paving, asphalt, removed, New York, N. Y. 117

Paving, bitulithic, Auburn, N. Y..... 57

Paving, block, Centralia, Ill..... 161

Paving blocks, purchase and remove, New York, N. Y. 117

Paving, block, relay, New York, N. Y... 89

Paving, brick, Altoona, Pa., 169; Belleville, Ill., 16; Centreville, Ia., 49; Champaign, Ill., 108; Huntington, W. Va. 179; Jersey Shore, Pa., 49; Kirksville, Mo., 179; Lexington, Ky., 117; Mercer, Pa., 100; Portsmouth, O., 16; Sherman, Tex., 153; South Bend, Ind., 126; Sterling, Ill., 108.

Paving, brick relay, Dayton, O., 40; New York, N. Y., 90.

Paving, boulder, relay, Dayton, O..... 40

Pavement, granite block, New York, N. Y. 216, 224

Paving, granite block, restore, New York, N. Y. 90

Paving, grouted, Denver, Colo..... 171

Pavement, flagging, New York, N. Y.216, 224

Paving, stone, Billings, Mont., 89; Brooklyn, N. Y., 170; Cincinnati, O., 126; Columbus, O., 195; New York, N. Y., 31, 143, 170, 187, 206.

Paving, relay and restore, New York, N. Y. 31

Paving, stone relay, Brooklyn, N. Y. 170

Paving, wood, Brooklyn, N. Y., 170; New York, N. Y., 117, 187.

Piles, Belle Fourche, S. Dak., 153; Brooklyn, N. Y., 179, 180; Charleston, S. C., 100; Chicago, Ill., 224; Duluth, Minn., 15; Grand Rapids, Mich., 126, 143; Lexington, Ky., 117; Providence, R. I., 40; Salt Lake City, Utah, 126; Washington, D. C., 108.

Piles, capping, Brooklyn, N. Y. 180

Piles, range, driving, Charleston, S. C.... 100

Piles, driven, New York, N. Y. 143

Piling, sheet, Brooklyn, N. Y., 180; New York, N. Y., 31, 89, 90, 170, 206, 216, 224.

Piling, sheet, driven and sawed off, New York, N. Y. 143

Pins, New York, N. Y. 57

Pipe, Lexington, Ky. 117

Pipe, blow off, Portland, Ore. 143

Pipe, cast iron, Chicago, Ill., 206; Columbus, O., 195; East Syracuse, N. Y., 15; Gettysburg, Pa., 31; Newton, N. J., 90.

Pipe, New York, N. Y., 216; Richmond, Va., 99.

Pipe, curved, Portland, Ore. 143

Pipe, excavation and fill—New York, N. Y. 224

Pipe, lead, laid, Dayton, O. 40

Pipe, lead, trench and lay, Dayton O.... 40

Pipe risers, Columbus, O., 195; Lexington, Ky., 117.

Pipe, steel, laying, Cincinnati, O. 126

Pipe, straight, New York, N. Y.....216, 224

Pipe, wrought iron, Columbus, O. 195

Pipe, vitrified, Belle Fourche, S. Dak., 153; Billings, Mont., 224; East Syracuse, N. Y., 15.

Planking, revetment, Charleston, S. C.... 100

Plugs, cast iron, Lebanon, Pa. 196

Puddle, Billings, Mont., 15, 216, 224; Denver, Colo., 171; Glendive, Mont., 195; Nashville, Tenn., 89; New York, N. Y., 170.

*Pumping machinery, Toledo, O. 6

Pumps, steam, Toledo, O. 6

Pumps, centrifugal, Toledo, O. 6

Quarry spalls, New York, N. Y. 143

Quarry stone, Washington, D. C. 161

Railing, Columbus, O., 195; Seattle, Wash., 73.

Railroad Rails, Montrose, Colo. 82

Reducer, Williamsburg, Pa. 143

Reinforcement, steel, concrete, Billings, Mont 224

*Reservoir, Dam, Danbury, Conn. 117

Revetment, Cincinnati, O., 126; New Orleans, La., 206; Philadelphia, Pa., 31.

Riprap, Billings, Mont., 15, 224; Clinton, Ia., 81, 179; Denver, Colo.,171; Nashville, Tenn., 89; New York, N. Y., 216; Portland, Ore., 57; Providence, R. I., 40; Richmond, Va., 99, 153.

Riprap stone, New York, N. Y., 153; Washington, D. C., 206.

Riveted work, New York, N. Y. 57

Rivets, Portland, Ore. 143

Rock excavation, Chattanooga, Tenn., 179; Danbury, Conn., 117; Denver, Colo., 171; Gettysburg, Pa., 31; Mount Vernon, Ill., 65; Nashville, Tenn., 89; New York, N. Y., 216, 224; Salt Lake City, Utah, 90; San Francisco, Cal., 73.

Rock excavation and refill, Havre Mont.. 40

Rock excavation, dredge, Newport, R. I., 15, 108; New York, N. Y., 90; Portland, Me., 153.

Rock excavation, extra, New York, N. Y. 224

Rock excavation, grading, Boston, Mass., 57; New York, N. Y., 152.

Rock removal, loose, New York, N. Y.... 152

Rock excavation, solid, Portland, Ore.... 57

Rock excavation, trench, wtihout blasting, New York, N. Y....31, 89, 90, 143, 170, 187, 206, 216

Rock excavation, trench, Chattanooga, Tenn., 171; Chicago, Ill., 224; Clinton, Ia., 81, 179; Elyria, O., 196; Lexington, Ky., 117; New York, N. Y., 31, 89, 90, 143, 170, 206; Newton, N. J., 90; St. Joseph, Mo., 99; Summit, N. J., 31; Union, N. J., 65.

Rock excavation, trench, and back fill, New York, N. Y. 187

Rock excavation, trench, loose, and refill, Richmond, Va. 153

Rock excavation, trench, solid, and refill, Richmond, Va. 153

Rock excavation, tunnel, Chattanooga, Tenn 171

Rock, rustic planted and doweled, New York, N. Y. 152

Rods, reinforcing, metal, Chicago, Ill.... 224

Rods, reinforcing, steel, Toledo, O..... 169

Rods, steel, Brooklyn, N. Y., 180; New York, N. Y., 187.

Rubble stone, New York, N. Y. 143

Rubble Wall, Billings, Mont. 224

*Sabine Lake Channel, New Orleans, La. 206

Saddles, water pipe, Portland, Ore....143, 206

Sand box, Seattle, Wash. 73

Sand, filter, placing, Cincinnati, O..... 126

Seeding, Cincinnati, O., 126; Columbus, O., 195.

*Sewage Disposal Plant, East Syracuse, N. Y. 15

*Sewage Purification works, Columbus, O. 195

Sewer basin, Brooklyn, N. Y. 179

Sewer, brick, Brooklyn, N. Y., 180; Chattanooga, Tenn., 171; Clinton, Ia., 81, 179; Chicago, Ill., 89; Elyria, O., 196; Parkersburg, W. Va., 144; Salt Lake City, Utah, 126.

Sewer, concrete, Brooklyn, N. Y., 179; Clinton, Ia., 81, 179; Grand Rapids, Mich., 65; Salt Lake City, Utah, 126; Washington, D. C., 73; Williamsport, Pa., 144.

Sewer, concrete block, St. Joseph, Mo.... 99

Sewer, concrete, "Parmley" system, St. Joseph, Mo. 99

Sewer, concrete, reinforced, St. Joseph, Mo. 99

Sewer, pipe, furnished and lay, Cape May, N. J., 144; Dayton, O., 40.

Sewer, pipe, Ames, Ia., 90; Brooklyn, N. Y., 170 179, 180; Chattanooga, Tenn., 171; Clinton, Ia., 81, 179; Columbus, O., 195; Elyria, O., 196; Janesville, Wis., 6; Lexington, Ky., 117; Parkersburg, W. Va., 144; Salt Lake City, Utah, 126; Seattle, Wash., 31, 48, 108; Watertown, Wis., 100; Williamsport, Pa., 144.

Sewers, pipe, Winnetka, Ill. 65

Sewer pipe, Gettysburg, Pa., 31; Kirksville, Mo., 179; Newton, N. J., 90; Ogden, Utah, 40; Seattle, Wash., 73; Winnetka, Ill., 65.

Sewer, pipe, laying, Boise City, Idaho, 179; Newton, N. J., 90; Summit, N. J., 31.

*Sewers, Ames, Ia., 90; Cape May, N. J., 144; Chattanooga, Tenn., 171, 179; Janesville, Wis., 6; Newton, N. J., 90; Ogden, Utah, 40.

Sewer, steel and concrete, Clinton, Ia. 81, 179

*Sewer System, Chicago, Ill., 206; Clinton, Ia., 81; Gettysburg, Pa., 31.

Sewer pipe specials, bends, Chattanooga, Tenn., 171; Lexington, Ky., 117.

Sewer pipe specials, connections, Boise City, Idaho, 179; Cape May, N. J., 144; Brooklyn, N. Y., 180; Gettysburg, Pa., 31; Williamsport, Pa., 144.

Sewer pipe specials, Y's, Boise City, Idaho, 179; Lexington, Ky., 117; Newton, N. J., 90; Winnetka, Ill., 65.

*Shoshone Dam, etc., Billings, Mont...15, 89

Sidewalk, asphalt, New York, N. Y.... 152

Sidewalks, cement, Brooklyn, N. Y., 170; Rochester, N. Y., 49; Waukegan, Ill., 73.

Sidewalks, concrete, Seattle, Wash....73, 108

Sidewalks, stone, Brooklyn, N. Y. 170; New York, N. Y., 187, 216, 224.

Sidewalk stone, reset, Bayonne, N. J., 196; Brooklyn, N. Y., 170.

Sleeves, Williamsburg, Pa. 143

Sod, New York, N. Y. 152

Sodding, Cincinnati, O., 126; Columbus, O., 195.

Sodding and seeding, Belle Fourche, S. Dak., 153; Danbury, Conn. 117.

Sodding and garden mold, New York, N. Y. 170, 216

*South Canal, Montrose, Colo. 82

Spikes, Grand Rapids, Mich. 90, 126, 143

Spikes, track, Washington, D. C. 117

Steel, Billings, Mont., 15; Belle Fourche, S. Dak., 153; Cincinnati, O., 126; Columbus, O., 195.

Steel bars, corrugated, furnish and place, San Francisco, Cal. 73

Steel bars, furnish and place, San Francisco, Cal. 73

Steel castings, New York, N. Y., 57; Pittsburg, Pa., 49.

Steel, concrete reinforcement, Billings, Mont. 224

Steel I Beams, Brooklyn, N. Y., 170, 180; Denver, Colo., 171; East Syracuse, N. Y., 15.

Steel plates, Portland, Ore. 143

Steel reinforcement, Cincinnati, O., 126; Denver, Colo., 171; Rochester, N. Y., 49; Salt Lake City, Utah, 90, 126; Washington, D. C., 108.

Steel reinforcement, setting, Salt Lake City, Utah 126

Steel rods, reinforcing, Portland, Ore., 57; Toledo, O., 99.

Steel rods, twisted, Columbus, O. 195

Steel shapes, Portland, Ore. 57

Steel, structural, Billings, Mont. 224

Steel trestles, Wheeling, W. Va. 108

Stone, Grand Rapids, Mich. 90, 126

Steps, stone, New York, N. Y., 152; Seattle, Wash., 31.

Steps, stone, reset, New York, N. Y..... 152

Stone, broken, Lexington, Ky. 117

Stones, still, Billings, Mont. 224

Stopcocks, New York, N. Y., 31, 143; Winnipeg, Man., 56.

Stopcocks and boxes, New York, N. Y. 31, 89, 90.

Stripping, Danbury, Conn. 117

*Structures, Huntley Project, Billings, Mont. 15

Subdrains, Ames, Ia., 90; Brooklyn, N. Y., 179, 180; Salt Lake City, Utah, 126; Seattle, Wash., 31.

Surfacing, Boston, Mass. 57

Suspenders, New York, N. Y. 57

Switches, Washington, D. C. 117

Tees, Williamsburg, Pa. 143

Test and Anchor holes, Portland, Ore.... 57

Tie plates, Washington, D. C. 117

Tie rods, Grand Rapids, Mich., 126, 143; New York, N. Y., 143, 152.

Tile drain pipe, Billings, Mont., 15; East Syracuse, N. Y., 15; New York, N. Y., 187.

Timber, see also Lumber.

Timber, Belle Fourche, S. Dak., 153; Brooklyn, N. Y., 170, 179, 180; Clinton, Ia., 81, 179; East Syracuse, N. Y., 15; Grand Rapids, Mich., 90, 126, 143; Nashville, Tenn., 89; New York, N. Y., 143; Portland, Ore., 57; Quincy, Mass., 73; Pittsburg, Pa., 49; Providence, R. I., 40; Summit, N. J., 31; Seattle, Wash., 31; Toledo, O., 99, 169.

*refers to title of work.